

DRAFT ENVIRONMENTAL ASSESSMENT
FOR
KA‘Ū PRESERVE
NATURAL AREA PARTNERSHIP

This document prepared pursuant to Chapter 343, HRS

Prepared by
The Nature Conservancy

April 2006

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I. SUMMARY

CHAPTER 343, HAWAI‘I REVISED STATUTES (HRS) ENVIRONMENTAL ASSESSMENT

Project Name

Ka‘ū Preserve Natural Area Partnership

Proposing Agency / Applicant

The Nature Conservancy
923 Nuuanu Avenue
Honolulu, Hawai‘i 96817

Approving Agency

State of Hawai‘i
Department of Land and Natural Resources
Division of Forestry and Wildlife

Anticipated Determination

FONSI

Project Location

Ka‘ū Preserve consists of 3,548 acres in the District of Ka‘ū, County of Hawai‘i, State of Hawai‘i. Owned by The Nature Conservancy of Hawai‘i.

<u>Unit</u>	<u>Tax Map Key</u>	<u>Acreage</u>	<u>Land Use</u>
Kāhilipali	3-9-7-001-002	169	Agriculture & Conservation (Resource)
Kī‘olokū	3-9-7-001-003	211	Agriculture
Kaiholena	3-9-7-001-004	2,657	Ag. & Cons. (Resource & Protective)
Keaīwa	3-9-7-001-007	511	Conservation (Protective)

Agencies Consulted During Draft EA Preparation

(The individuals and agencies listed were provided with copies of the preserve's long-range management plan, and given 4 weeks to respond. All comments received are included in Appendix 1.)

Federal

US Geological Survey/Biological Resources Division
Volcano, HI 96785

Hawai'i Volcanoes National Park
Volcano, HI 96785

State

DLNR, Division of Forestry and Wildlife
Hilo, HI 96720

DLNR, Division of Land Management
Honolulu, HI

Natural Area Reserves System Commission
Honolulu, HI

Ola'a Kīlauea Partnership
Volcano, HI 96785

County

Planning Department
Hilo, HI 96720

Hawai'i Community College, Hawaiian Life Styles
Hilo, HI 96720

Private

Wally Andrade
Na'alehu, HI 96772

Phil Becker
Pahala, HI 96777

Peewee Brighthop
Naalehu, HI 96772

Audie Cabudol
Naalehu, HI 96772

C. Brewer
John Cross
Papaikou, HI 96781

Wade Espajo
Naalehu, HI 96772

Alfred Galimba
Kuahiwi Contractors
Papaikou, HI 96782

Keolalani Hanoa
Naalehu, HI 96772

Hawai'i Wildlife Fund
Bill Gilmartin
Volcano, HI 96785

Richard Johansen
Naalehu, HI 96772

Kamehameha Schools, Bishop Estate
Peter Simmons, Kamakani Dancil, Namaka Whitehead
Paauilo, HI 96776

Dean Kaniho
Naalehu, HI 96772

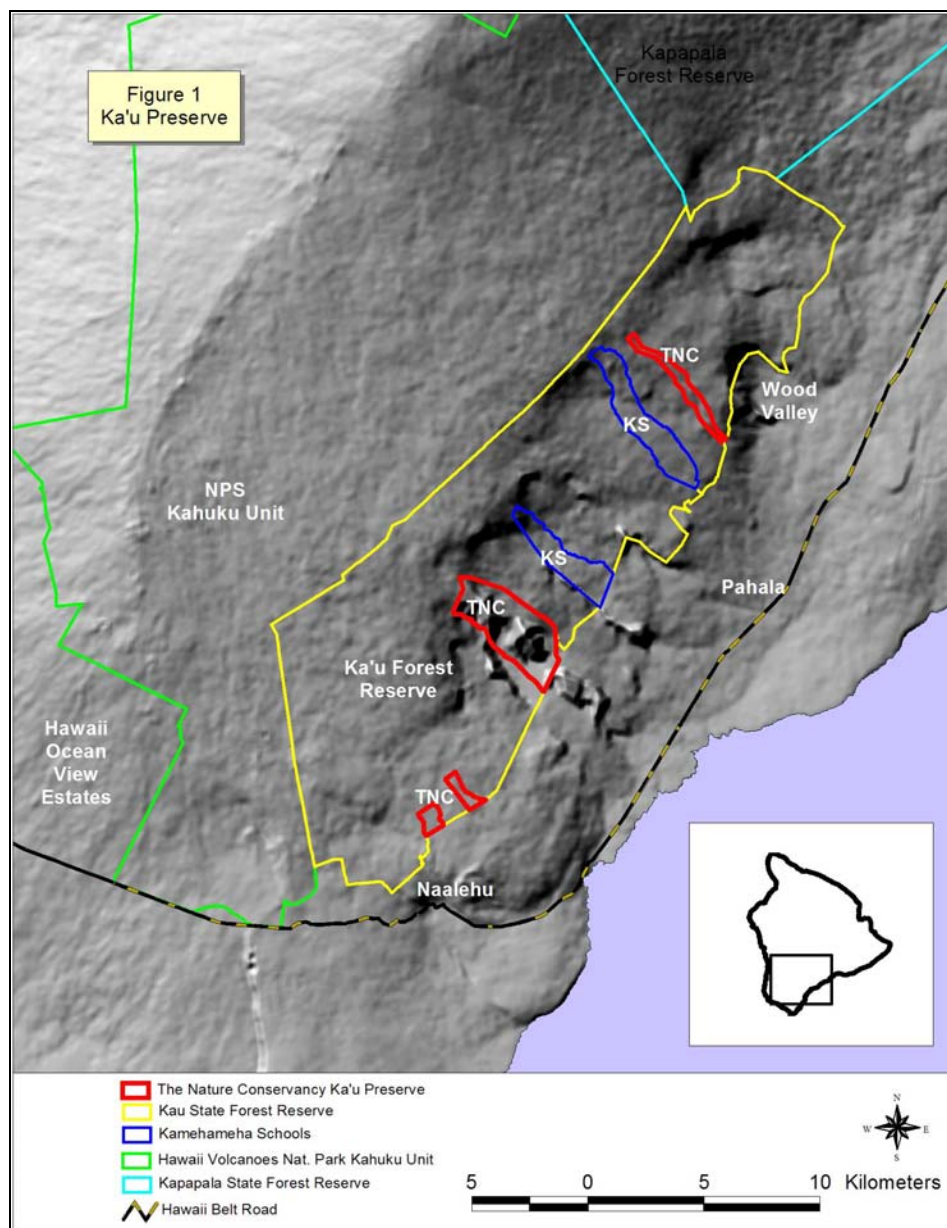
Thomasina (Asha) Malek
Papaikou, HI 96781

Edward Olson
Hilo, HI 96720

Stephanie Tabada
Naalehu, HI 96772

II. PROJECT DESCRIPTION

Ka'ū Preserve (Figure 1) was established in 2002 to protect biologically rich and intact forest. It was purchased from a subsidiary of C. Brewer & Co. Ltd. who had owned the lands for over 100 years. The primary goal of this project is to maintain the preserve's native ecosystems and protect the area's rare plants and animals. Management at Ka'ū Preserve is being considered for funding under the State's Natural Area Partnership (NAP) Program. This innovative program provides matching funds (\$2 state to \$1 private) for the management of qualified private lands that have been permanently dedicated to conservation. The proposed management programs comprise a six-year management plan for the Ka'ū Preserve with an overall budget totaling \$1,128,252. Through the NAP program, the state pays two-thirds of the management costs for an anticipated total State contribution of \$752,168.



Summary Description of the Affected Environment

Location

The 3,548-acre preserve is located on the island of Hawai‘i on the southeast flank of Mauna Loa volcano. This preserve includes four separate units (Kāhilipali, Kī‘olokū, Kaiholena, and Keaīwa) spanning 12 miles and ranging from 2,000-5,700 feet in elevation. It is adjacent to the State's Ka‘ū Forest Reserve and is positioned within one of the largest areas of intact forest land in the State, totaling 68,500 acres. The preserve itself lies up slope from the coastal agricultural area between Wai‘ōhinu and Pāhala in the Ka‘ū District. It is part of the Moku o Keawe and lies within four ahupua‘a: Kāhilipali Nui, Kī‘olokū, Hīlea, and Keaīwa. The four units are zoned Agriculture and Conservation (subzones: Protective and Resource). The Hawaii County planning land use areas include Important Agricultural Lands, Extensive Agriculture and Conservation. The two southern units are in the volcano hazard zone 6, while the northern units are in volcano hazard zone 3.

Portuguese Springs is located in the upper northeast corner of the Kāhilipali unit, at the head of Alapa‘i Gulch, which runs along the northeast boundary of the unit. Ha‘ao Springs is also located within this watershed, makai of the Kāhilipali unit. Plantation Springs is located within the Kaiholena unit boundary. The Keaīwa unit is located within the watershed that feeds water into the Keaīwa Reservoir. The Ka‘ū Preserve units’ location within these watersheds means that they play a key role in the collection and distribution of water into the streams and groundwater.

As a result of sharing the southern (lowland) boundary with private agricultural lands, access via unimproved roads is established through access easement agreements and the roads are therefore private. Public roads that are currently used to access Ka‘ū watershed lands include: Hā‘ao Springs Road, Mountain House Road and Lorenzo Road. Access into the upper areas of the preserve is limited by difficult terrain and a lack of roads and trails, so helicopter access is necessary. Access into upper areas of the Ka‘ū Forest Reserve is anticipated to improve with the acquisition of Kahuku Ranch by the National Park Service.

Native Natural Communities

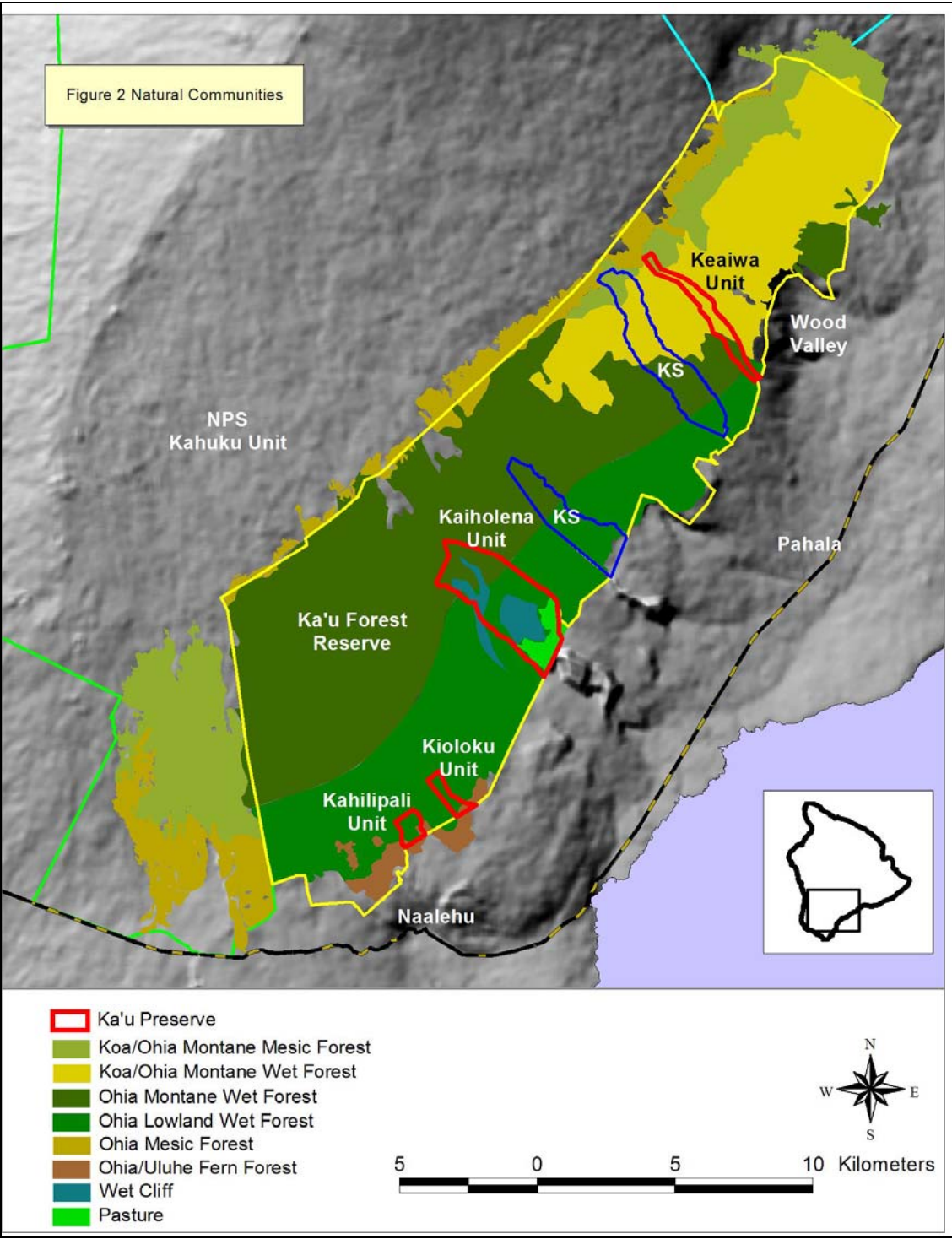
Ka‘ū Preserve contains four natural community types, ranging from lowland wet forests to montane mesic (moist) forests (Figure 2). There is one rare natural community: the Koa/‘Ōhi‘a Montane Mesic Forest.

Table 1. Natural Communities of Ka‘ū Preserve

Natural Community (common and scientific names)	Heritage Global Rank*
Koa/‘Ōhi‘a Montane Mesic Forest <i>Acacia koa</i> / <i>Metrosideros polymorpha</i> Montane Mesic Forest	G1
Koa/‘Ōhi‘a Montane Wet Forest <i>Acacia koa</i> / <i>Metrosideros polymorpha</i> Montane Wet Forest	G3
‘Ōhi‘a Montane Wet Forest <i>Metrosideros polymorpha</i> Montane Wet Forest	G3
‘Ōhi‘a Lowland Wet Forest <i>Metrosideros polymorpha</i> Lowland Wet Forest	G3

* Key to Heritage Global Ranks:

G1 = Critically imperiled globally (typically 1-5 current occurrences).
G3 = Moderately imperiled globally or restricted in range (typically 21-100 current occurrences).



Native Flora

The mesic and wet forests of the Ka‘ū region are home to at least 12 known species of rare plants. Six of these are endangered, two are candidates for listing as endangered, three are species of concern, and one has a restricted range.

Table 2. Rare Plants of Ka‘ū Preserve (or vicinity)

Species	Federal Status*	Heritage Global Rank**
<i>Asplenium fragile</i> var <i>insulare</i>	LE	G5T1
<i>Clermontia lindseyana</i>	LE	G1
<i>Cyanea stictophylla</i>	LE	G1
<i>Cyanea tritomantha</i>	C	G1
<i>Lobelia hypoleuca</i>	-	G3
<i>Melicope zahlbruckneri</i>	LE	G1
<i>Nothocestrum breviflorum</i>	LE	G1
<i>Phyllostegia floribunda</i>	C	G1
<i>Phyllostegia velutina</i>	LE	G1
<i>Phyllostegia vestita</i>	SOC	G2
<i>Pritchardia lanigera</i>	SOC	G1
<i>Trematolobelia grandifolia</i>	SOC	G2

*** Key to Federal Status:**

Listed Endangered (LE) = Taxa listed as endangered.

Candidate (C) = Taxa for which substantial information on biological vulnerability and threat(s) support proposals to list them as threatened or endangered.

Species of Concern (SOC) = Taxa for which available information meets the criteria for concern and the possibility to recommend as candidate.

**** Key to Heritage Global Ranks:**

G1 = Critically imperiled globally (typically 1-5 current occurrences).

G2 = Imperiled globally (typically 6-20 current occurrences).

G3 = Moderately imperiled globally or restricted in range (21-100 current occurrences).

G5 = Demonstrably widespread, abundant, and secure.

T1 = Subspecific taxa critically imperiled globally. 1-5 occurrences and/or fewer than 1,000 individuals remaining; or more abundant but facing extremely serious threats range-wide.

Native Terrestrial Fauna

One of the richest assemblages of endangered forest birds (*e.g.*, Hawai‘i Creeper, Hawai‘i ‘Ākepa, ‘Akiapōlā‘au, ‘Io) inhabit the largely intact forests of Ka‘ū. The ‘Io, the Hawai‘i ‘Ākepa, and the ‘Alalā have been historically found within Ka‘ū Preserve but now are probably extirpated. Two other rare bird species are likely to occur in the preserve, but more information is needed: ‘Akiapōlā‘au and the Hawai‘i Creeper.

Endangered Hawaiian hoary bats, ‘ōpe‘ape‘a, are also known to inhabit the wet montane forests of Ka‘ū and likely roost, forage, and breed in the preserve, but more information is needed (Theresa Menard, pers. comm.).

Few native invertebrates have been given endangered status, and are generally very poorly understood, but the intact natural communities of Ka‘ū no doubt include hundreds of native invertebrates, the majority of which are endemic to the archipelago, and several of which are likely endemic to the Ka‘ū region.

Table 3. Rare Vertebrates of Ka‘ū Preserve (or vicinity)

Species	Federal Status*	Heritage Global Rank**
<i>Buteo solitarius</i> (Hawaiian Hawk, ‘Io)	LE	G2
<i>Corvus hawaiiensis</i> (Hawaiian Crow, ‘Alalā)	LE	G1
<i>Hemignathus munroi</i> (‘Akiapōlā‘au)	LE	G1
<i>Lasiurus cinereus semotus</i> (Hawaiian hoary bat, ‘ōpe‘ape‘a)	LE	G5T2
<i>Loxops coccineus coccineus</i> (Hawai‘i ‘Ākepa)	LE	G2
<i>Oreomystis mana</i> (Hawai‘i Creeper)	LE	G2

* Key to Federal Status:

Listed Endangered (LE) = Taxa listed as endangered.

** Key to Heritage Global Ranks:

G1 = Critically imperiled globally (typically 1-5 current occurrences).

G2 = Species imperiled globally (typically 6-10 current occurrences).

G5 = Demonstrably widespread, abundant, and secure.

T2 = Subspecific taxa imperiled globally. 6-20 occurrences and/or 1,000-3,000 individuals remaining; or more abundant but facing serious threats range-wide.

Historical/Archaeological and Cultural Sites

Land management to protect native species and ecosystems can serve as a first step in the protection of archaeological sites in the higher elevation areas, if sites exist there. Ungulates, particularly feral pigs, cattle and goats, are known to disturb archaeological sites because they knock over stone walls, turn over soil, spread noxious weeds, and initiate accelerated erosion and landslides. As native ecosystems degrade in culturally important regions, the original native context for the site may be lost, and elements of the natural world that traditionally characterized a built site or a wahi pana (renowned place) may be damaged. Therefore, the long-term goals of land management of controlling and removing feral animals, stopping the spread of invasive weeds, and restoring native vegetation, are crucial to protect archaeological sites.

In higher elevation lands that come under management of native ecosystems, there are typically few, if any archeological sites (such as walled structures, terraces, etc.), because these areas typically fell within the wao akua (realm of the gods), a zone lying typically higher in elevation above the wao kanaka (realm of people – where habitation, agriculture, and the majority of human activities took place). Although exceptions are rare, in the rich cultural setting of Ka‘ū a few significant sites such as the heiau atop Makanau near the Kaiholena Unit boundary, suggest that appropriate care be taken when implementing management actions. The land management activities proposed in this plan are meant to restore and protect the native ecosystems which lie within the wao akua, thereby protecting the living context of the cultural landscape and the natural resources traditionally gathered in the area.

The following steps were taken to determine the cultural and historical significance of the project area. First, a general literature review was conducted to determine if there were any studies of the area or any myths or legends specific to the area. Consistent with field reconnaissance and local traditional sources, there are no documented man-made sites in the forested lands within the preserve. The vast majority of such sites are located in the coastal and lowland zones of Ka'ū. Second, a ground survey of the Hilo side of proposed Fence A by a local cultural practitioner, Dr. Taupōuri Tangarō, was conducted on May 20, 2005. Dr. Tangarō is a professor in the Hawaiian Lifestyles Program at Hilo Community College and a hula practitioner and member of the Hālau O Kekuhi school of traditional hula. Dr. Tangarō did not observe any archaeological sites along the surveyed fence route, although he acknowledges the rich assemblage of cultural sites in Ka'ū District in general. He feels that the physical contribution of the proposed project will be positive, though he states in his Cultural Impact Assessment that some psychological issues may result (see Appendix 2). The CIA was reviewed by Cultural Specialist and Ahupua'a resident, Keola Hanoa. Her comments are included in Appendix 3.

A site visit and archeological survey of the proposed fence site by NPS archaeologist Jen Waipa took place on February 23, 2006. All project fences will be placed to avoid historic sites that may be found. Our intent is to give protection of such sites appropriate priority.

Contemporary cultural practices occurring on the preserve include recreational pig hunting. The 62,000-acre Ka'ū Forest Reserve surrounding the preserve, and the nearby 36,000-acre Kapāpala Forest Reserve are designated DOFAW hunting areas.

Adjacent Natural Resources

The Nature Conservancy's Ka'ū Preserve is positioned within one of the largest areas of intact forest land in the State, totaling 68,500 acres. The preserve's four units are embedded within the State's Ka'ū Forest Reserve. This Reserve is described in the Division of Forestry and Wildlife's draft management guidelines as V-1: the highest quality native ecosystems and communities, with low levels (less than 10%) of non-native plants in any vegetative layer. Though the Reserve itself is not actively managed, the primary objective of public game control, according to the draft guidelines, is resource protection, with emphasis on native plant communities and watersheds.

The Ka'ū Forest Reserve consists of six natural communities including the rare Koa/'Ōhi'a Mixed Montane Mesic Forest (Global Rank = G1). These six natural communities provide habitat for hundreds of plant species and several common forest birds. Besides the more common forest birds the Ka'ū Forest Reserve provides habitat for four endangered forest birds. These include the Hawai'i Creeper, Hawai'i 'Ākepa, 'Akiapōlā'au, and the Hawaiian Hawk or 'Io. In addition to the rare and endangered birds, the Ka'ū Forest Reserve harbors at least 12 known rare and endangered plants.

Sensitive Habitats

The entire native habitat found on Mauna Loa's southeast slope can be considered sensitive, especially for native forest birds. The proposed management activities contained within this document are aimed at ensuring the long-term protection of the native habitat of Ka'ū and its resources. Potential negative effects of management activities such as the introduction of non-

native plants along newly constructed fences, trails, and monitoring transects are minor, and are reduced by following strict cleaning protocols for all items transported into the preserve. Furthermore, any management activity which might impact neighboring sensitive habitats in the Ka'ū Forest Reserve, or private lands will be discussed and examined with the appropriate land managers.

General Description of the Action's Technical, Socio-Economic, and Environmental Characteristics

Technical Characteristics

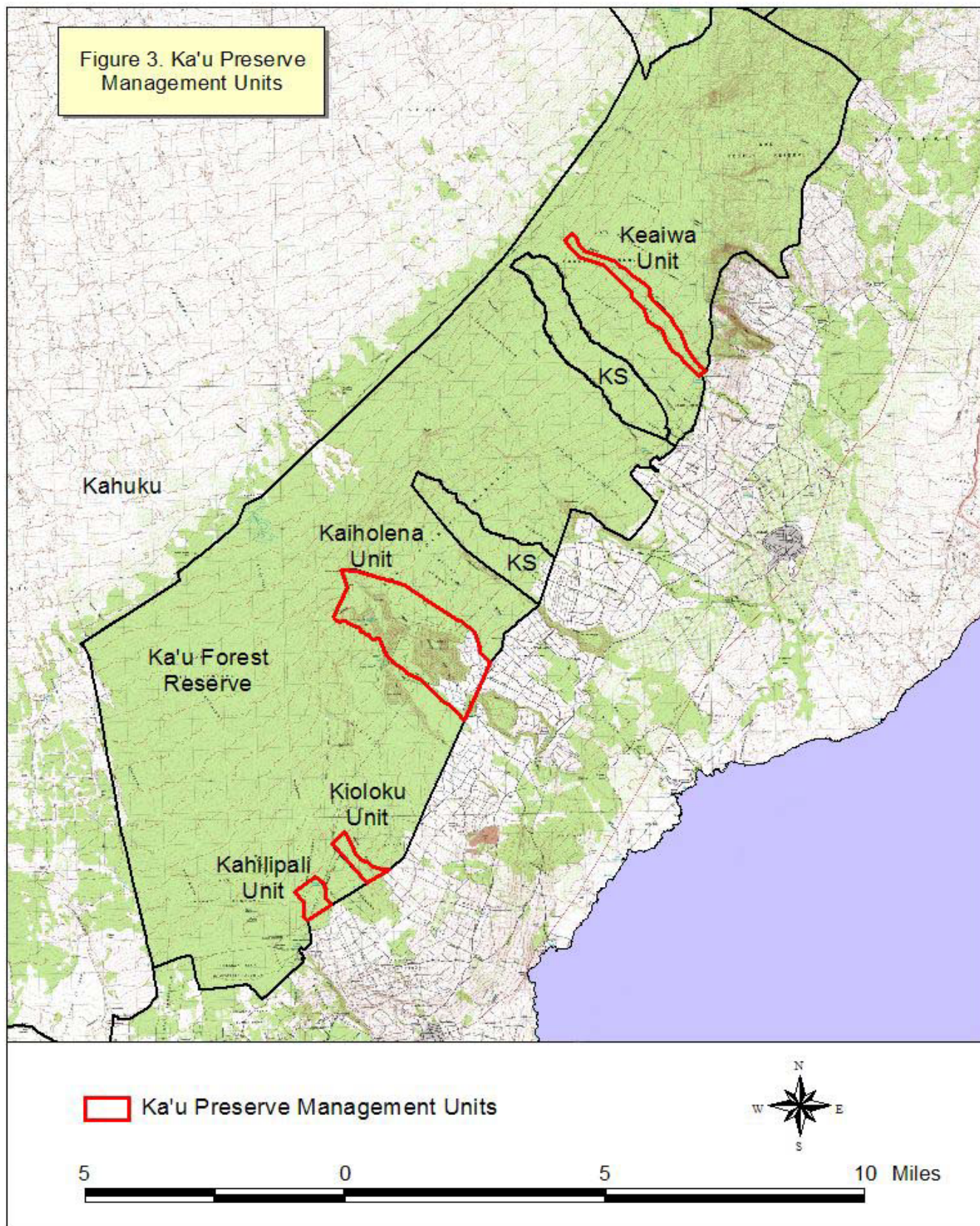
This project is long-term and consists of several distinct research, monitoring, and management facets. Approval of this project will assure the long-term survival of Ka'ū's unique native birds, plants, and insects. The primary goal is to maintain native ecosystems and protect the habitat of rare plants and animals in the designated area. Management goals for six fiscal years (FY2007-2012) are discussed below. (The Nature Conservancy has adopted a July 1 – June 30 fiscal year.) The Nature Conservancy of Hawai'i will be responsible for the completion of the management work. The following sections describe specific management strategies that will be undertaken to maintain and enhance the native ecosystems and species of Ka'ū Preserve. These management strategies are shaped by the following considerations.

Management Considerations

1. Our primary management focus is to prevent degradation of the native forest by reducing feral ungulate damage, limiting the spread of non-native, habitat-modifying plants, and preventing the introduction of other invasive species. We are also committed to improving community outreach and to continue providing access as required by law for people who want to use the preserve in ways that will not degrade its natural resources.
2. The preserve is divided into four separate units spanning a distance of 12 miles. Each unit shares three boundaries with the State's Ka'ū Forest Reserve, and one boundary with a private landowner who recently purchased the properties from Ka'ū Agribusiness, a subsidiary of C. Brewer. As a result of sharing the southern (lowland) boundary with private agricultural lands, public access via unimproved roads is somewhat limited, and we carefully coordinate our management and interpretive activities with work in these adjacent agricultural areas.
3. Although the threat of fire is somewhat diminished due to the high level of precipitation on the Preserve (approximately 60-120 inches annually), the proximity of the units to paved roads increases the possibility that a fire could start either accidentally or intentionally and affect the Preserve, particularly after a period of drought. Our participation with the Three Mountain Alliance will include working on a Fire Initiative with the other Alliance members.
4. The recent acquisition of Kahuku Ranch by the National Park Service (NPS) creates a mosaic of Ka'ū lands, with four principal landowners, all sharing a mandate for

conservation and management of Hawai‘i's natural resources: The Nature Conservancy, NPS, the State Department of Land and Natural Resources, and Kamehameha Schools. This provides the foundation for collaborative management at the watershed level as an effective way to address shared management challenges and opportunities.

5. There is potential to provide additional public access to the Forest Reserve and the preserve at several points along their lower boundaries, as most access roads are not open to the public at this time. Roads that are currently used by the public to access Ka‘ū watershed lands include: Hā‘ao Springs Road, Mountain House Road and Lorenzo Road. Access into upper areas of the Forest Reserve is anticipated to improve with the acquisition of Kahuku Ranch by NPS. Access into the upper areas of the preserve is limited by difficult terrain and a lack of roads and trails, so helicopter access is necessary.
6. There is a high level of interest regarding forest management in Ka‘ū from various groups of people living near the preserve. This provides a rationale for coordinated community outreach and functional partnerships that promote compatible uses of the forest (*e.g.*, environmental education, recreation, native gathering, hunting, rare species conservation, etc.).
7. As provided by law, appropriate access to the preserve for traditional practice will help to mitigate the perception of decreased access. Three gates will be available for preserve access on the Kaiholena side and fence stepovers will be installed if needed, with locations to be determined in consultation with the community.



Management Units

Ka‘ū Preserve is divided into four separate units ranging in elevation from 2,000-5,700 feet: Kāhilipali, Kī‘olokū, Kaiholena, and Keaīwa (Figure 3).

1. The Kāhilipali unit is the smallest (169 acres) and westernmost unit, accessed via the 4wd Mountain House Road. The elevation ranges from approximately 2,400 to 2,640 ft. The annual precipitation is 2,000 mm (79 in). A portion of this unit is zoned Agriculture and the rest is zoned for Conservation (subzone: Resource). Most of the unit contains ‘Ōhi‘a Lowland Wet Forest, however the forest in the lower portion of the unit grades into the community subtype ‘Ōhi‘a /Uluhe Fern Forest. Portuguese Springs is located in the upper northeast corner, at the head of Alapa‘i Gulch, which runs along the northeast boundary of the unit. A maintained pipeline diagonally traverses the middle of the unit providing a corridor for non-native invasive plants such as guinea grass (*Panicum maximum*), sourbush (*Pluchea carolinensis*) and bamboo orchid (*Arundina graminifolia*), and more serious weeds such as strawberry guava (*Psidium cattleianum*), Koster's curse (*Clidemia hirta*), and Christmas berry (*Schinus terebinthifolius*). Glorybush (*Tibouchina urvilleana*) occurs along the Mountain House Road.
2. The Kī‘olokū unit is the next largest (211 acres) and is located approximately 1 mile north of the Kāhilipali unit. The elevation ranges from approximately 2,400 to 2,700 ft. The annual precipitation is 2,000 mm (79 in). The lower portion is accessed via ranch roads, while the upper elevation is accessed via the 4wd Mountain House Road. Waiaele Gulch runs along a portion of the northeast boundary of the unit. The forest, like the Kāhilipali unit, is mainly ‘Ōhi‘a Lowland Wet Forest, with some areas of ‘Ōhi‘a /Uluhe Fern Forest. Glorybush (*Tibouchina urvilleana*) occurs along the Mountain House Road, and weeds such as strawberry guava (*Psidium cattleianum*) and Koster's curse (*Clidemia hirta*) are present in the forest. This unit is zoned for Agriculture.
3. The Kaiholena unit is the largest (approximately 2,600 acres) and is centrally located 4 miles from the Kī‘olokū unit and 6 miles from the Keaīwa unit. A pu‘u (hill or mount), Kaiholena, rises sharply from its base elevation of 2,000 ft to a height of 3,723 ft and is geologically much older than the surrounding, more gently rolling Mauna Loa flows. Just northwest of the Pu‘u Kaiholena, Pu‘u Makaalia rises to a height of 4,240 ft. Hīlea Gulch runs between these two pu‘u. Old Plantation Springs, a portion of whose water rights are held by the previous owner, is nestled in the southern folds of Pu‘u Makaalia at approximately 3,500 ft. The annual precipitation is 2,000 mm (79 in) except for a wetter area on the south side of Pu‘u Kaiholena which has 3,000 mm (118 in) annual precipitation. A portion of this unit is zoned Agriculture and the rest is zoned for Conservation (subzones: Protective and Resource).

Directly south of Pu‘u Makaalia lies Pu‘u One (3,220 ft elevation), on State land just outside of the Kaiholena unit boundary. Historically this pu‘u was considered together with the others as one place. The western side of Pu‘u One is accessed via a 4wd road that leads to a gauging station on one branch of Hīlea Gulch.

The forest in the lower portion of the Kaiholena unit is 'Ōhi'a Lowland Wet Forest, becoming 'Ōhi'a Montane Wet Forest at approximately 3,200 ft elevation. Five rare plants have been reported in this unit. Very few weeds have established in Kaiholena. Those present and still controllable include Japanese anemone (*Anemone hupehensis*), palm grass (*Setaria palmifolia*), and strawberry guava (*Psidium cattleianum*). *Tibouchina herbacea* is present along the Pu'u One access road. There are 315 acres of former cane land at the base of the Pu'u Kaiholena which have been converted to pasture and are now leased by a local rancher for cattle grazing. An incipient population of silk oak (*Grevillea robusta*) occurs within the pasture.

4. The Keaīwa unit is the second largest (511 acres) and easternmost unit. Keaīwa Reservoir (on State land) lies at the base of the unit at approximately 3,000 ft elevation. From there the unit stretches mauka. A 6 km-long strip of land, at its widest point, the Keaīwa unit is only 570 m wide. Its northern boundary (5,700 ft) is approximately 1 km from the Kahuku unit of Hawai'i Volcanoes National Park. The annual precipitation in the lower portion of the unit is 3,000 mm (118 in), in the middle portion is 2,000 mm (79 in) and in the upper portion is 1,500 mm (59 in). Pi'ikea and Kā'ala'ala Gulches meander in and out of the Keaīwa unit. The uppermost portion of the unit (above 5,300 ft) contains Koa/'Ōhi'a Montane Mesic Forest (50 acres), while much of the rest of the unit consists of Koa/'Ōhi'a Montane Wet Forest, except for lower third of the site (below 4,000 ft) which is 'Ōhi'a Montane Wet Forest and the bottom 50 acres (below 3,400 ft) which are 'Ōhi'a Lowland Wet Forest. The endangered forest bird, Hawai'i 'Ākepa, has been reported in this unit, observed between 4,000 and 5,000 ft elevation in 1995. Several highly invasive plants occur near the Keaīwa Reservoir, including night-blooming jasmine (*Cestrum nocturnum*), Japanese anemone (*Anemone hupehensis*), and strawberry guava (*Psidium cattleianum*). The nearby village of Wood Valley (2 km away) is heavily infested with plume poppy (*Bocconia frutescens*), and the community there is also in the process of eradicating an incipient population of coqui frogs. This unit is zoned for Conservation (subzone: Protective).

Management Goals

The management programs for 2007 – 2012 are: 1) Ungulate Control, 2) Invasive Plant Control, 3) Resource Monitoring, 4) Rare Species Protection and Enhancement, 5) Community Outreach, and 6) Watershed Partnership. Each program goal is followed by a brief description of program strategies and key management issues. Finally, a concise list of objectives for FY 2007 – 2012 is laid out for each program. Though each program is described separately, together they form an integrated management approach. Management priorities focus on removing ungulates and habitat-modifying weeds.

Management Programs

Program 1: Ungulate Control

Program Goal: To eliminate ungulates (cattle, pigs, sheep, and goats) from the Kaiholena Unit by 2012 and to reduce ungulate damage in the Kāhilipali, Kī‘olokū, and Keaīwa Units.

This program represents an estimated 44% of the overall effort and budget in this long range management plan.

Preliminary measurements on survey transects show extremely high levels of ground disturbance by pigs: 100% of 30 stations in the Kaiholena Unit showed pig activity. Additional surveys conducted in the Keaīwa Unit and parts of the Ka‘ū Forest Reserve show extensive, severe ground disturbance by pig activity. Diminished diversity of groundcover and understory species has been observed over large areas. In some severely impacted parts of the forest common groundcover and understory plants are persisting only epiphytically upon trees and tree ferns. Weed surveys conducted in the Kaiholena Unit show a direct correlation between presence of weed species and pig activity. High levels of ground disturbance, coupled with reduced groundcover, has led to an increase in water runoff, sheet erosion and stream bank collapse. There is also a very high likelihood of wild cattle, Mouflon sheep and feral goats in the vicinity.

Of the four Ka‘ū Preserve units, the largest expanse of intact, high-quality native lowland wet forest and most significant biological resources (rare plants and high native diversity) occur in the roughly 2600-acre Kaiholena Unit. Therefore the best and most cost-effective alternative is to enclose the Kaiholena Unit by incrementally building fences and to utilize trapping and hunting to bring the number of feral ungulates in the enclosures to zero as quickly as possible.

Construction of the first proposed fence in the Kaiholena Unit is being planned for Year 1. The proposed alignment will enclose 980 acres including Pu‘u Kaiholena, allowing the now uncommon native plants that persist only in the steep gullies and folds of the pu‘u to expand their coverage. It will also protect the culturally significant Iholena Banana patch, and, once ungulates are removed, this enclosure will serve as a reintroduction site for several rare plants. Surveys will be conducted in Year 3 to find the optimum alignments for additional fences in the Kaiholena Unit, our main objective being to remove ungulates from Pu‘u Makaalia.

The majority of the proposed alignment follows existing 4-wheel drive roads and pasture edges. It is much more feasible to align the fence along existing roads as much as possible than to follow the unit’s boundary which is located in more difficult terrain. The proposed alignment ties in to the extremely steep terrain of Hīlea Gulch. Through ground reconnaissance we have determined that the natural barrier of this gulch will work to keep ungulates out. The sides of this gulch are predominantly vertical and are impassible by ungulates. The few places which can be traversed will be fenced off with sections of ungulate-proof fencing. Utilizing the gulch as a barrier rather than totally encircling the pu‘u with a continuous fence expands the total enclosure area by 200 acres and will effectively restore a highly eroded plain that ultimately feeds into Hīlea Stream.

Protecting the stream banks and restoring the plain will stop sediment from running off into the stream and depositing in the ocean.

Pig traps made from hog panels will be placed on the perimeter of the unit. The traps will be baited with macadamia nuts and checked frequently. This technique has proved extremely successful in our Kona Hema Preserve where over 400 pigs have been removed from the 1,800 acre Kapu‘a unit over the last 3 years. Supplemental hunting will take place by staff and/or volunteers. Permanent ungulate activity monitoring transects have been installed in the Kaiholena unit and will be monitored when the fence is constructed and every 6 months after that for detection of changes in ungulate activity level.

The estimated cost of this fence is approximately \$200,000 and will be subcontracted out. Funding for fence construction has been secured through the USDA Natural Resources Conservation Service’s Wildlife Habitat Incentives Program (NRCS WHIP), which will provide up to 75% of the cost. The rest of the cost will be covered by TNC and a portion will be matched with this NAPP request.

Relying on public hunting, aerial shooting, staff hunts, and other means to reduce feral animal populations instead of fenced enclosures is not a feasible alternative because as long as the Kaiholena Unit remains unfenced, feral animals will continue to enter the area from adjacent lands. Animal removal would have to continue indefinitely. This long-term control program would be expensive and unpopular, and make the goal of natural resource protection and rare plant reintroduction impossible. The best long-term solution is therefore to enclose the Kaiholena Unit, and remove all feral ungulates as quickly as possible.

However, constructing fences that enclose all four Ka‘ū Preserve units is not cost-effective or feasible at the present time. The Kāhilipali and Kī‘olokū units are isolated, small (169 and 211 acres, respectively), and somewhat degraded by invasive plants. Therefore fencing these units would not result in a significant enough contribution to resource protection from ungulates to justify the expenditure of funds that fencing would require. The Keaīwa unit (511 acres) is a “spaghetti” parcel with elongated dimensions: 6 km long by 500 m wide. Although significant biological resources are present, particularly in the upper elevation, we are not proposing to construct fences in this unit at the present time. However, the acceptance of this 6-year plan does not preclude the re-consideration of this possibility in the future.

In these unfenced units, as well as the unfenced portions of the Kaiholena unit our objective is to reduce ungulate damage by enhancing hunter access (by installing signs, check-in stations, etc.) and encouraging public hunting in these areas through outreach. A back-country camp consisting of two canvas tent cabins is being proposed in the upper reaches of the Kaiholena unit. This will enable staff to have a dry place to camp overnight while conducting surveys, monitoring, and constructing fence. These tents will also be available for hunters to use. Permanent ungulate activity monitoring transects have been installed in these units and will be monitored periodically for detection of changes in ungulate activity level.

Additionally, in cooperation with the NPS, the State and Kamehameha Schools, a site survey for optimum large-scale ungulate fencing will be conducted (see Watershed Partnership Program).

Strategies to remove ungulates from remote areas and to enhance ungulate hunter access will be identified and implemented.

Ungulate Control Program Activities

Year 1 (FY2007)

- Construct fence (Figure 4)
- Make existing cattle fence ungulate-proof
- Construct back-country camp (tent cabins, water catchment) and LZ's
- Begin ungulate removal
- Identify/implement strategies to enhance ungulate hunter access

Year 2 (FY2008)

- Continue ungulate removal
- Maintain fences and signs
- Assist NPS/State in site survey for optimum ungulate fencing

Years 3-6 (FY2007-FY2012)

- Continue ungulate removal
- Maintain fences and signs
- Survey for optimum placement of additional fences in Kaiholena unit

Fence specifications: The ungulate control fence will be 30,900 linear feet in length (elevation 2,000 to 3,400 ft) and will enclose 980 acres, utilizing the extremely steep terrain of Hīlea Gulch (which is impassible by ungulates) as tie-off points (Figure 4). The fence alignment may change slightly, depending on the terrain. Where the fence crosses the road a gate will be installed for vehicle access. Three additional gates will be available for preserve access on the Kaiholena side and fence stepovers will be installed if needed, with locations to be determined in consultation with the community. Roughly 30% of the proposed fence alignment follows the edge of a pasture (10,250 ft), another 50% follows an existing 4WD road (15,105 ft) so minimal disturbance to vegetation will be required to install and maintain these sections. For the more remote sections, a corridor 4 ft. wide will be brushed to install the fence for a distance of 5,545 ft.

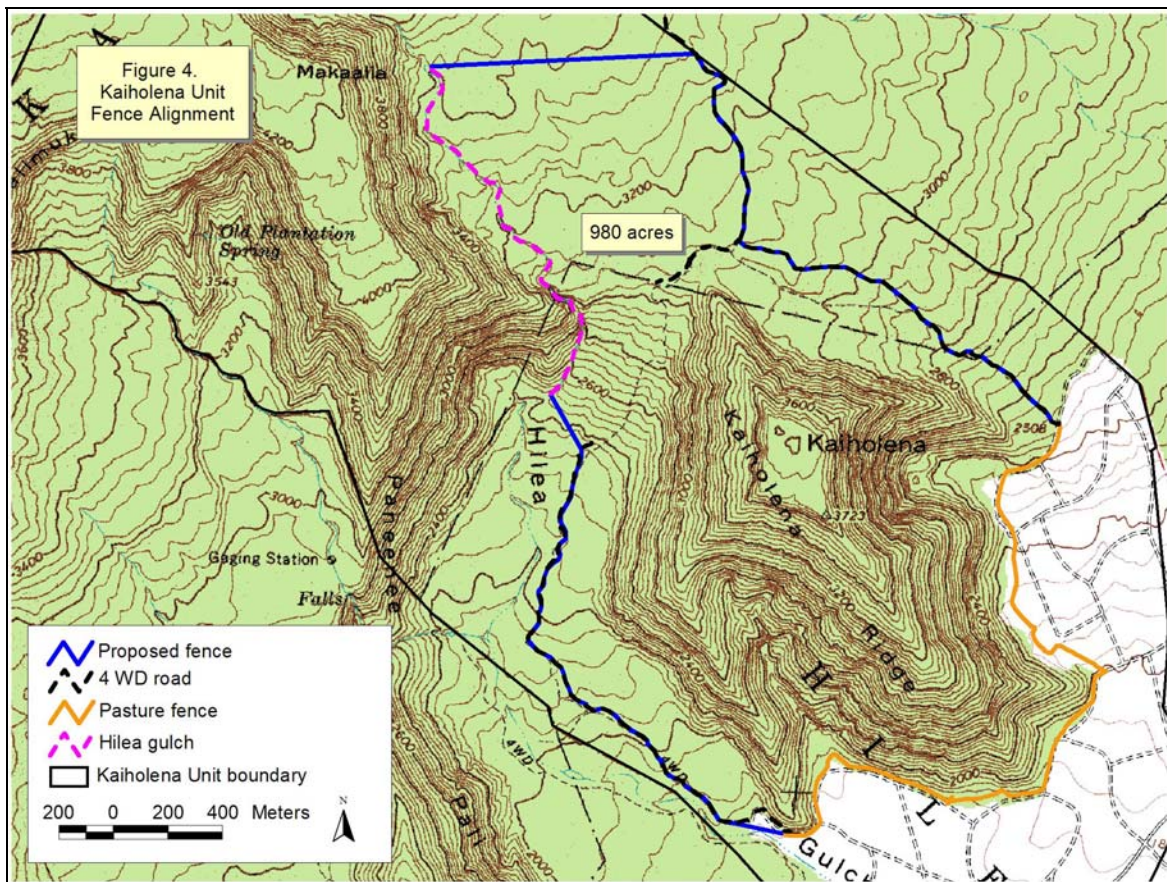
The ungulate fence will be constructed using 4 ft high tensile Bezinol-treated hogwire (1047-6-12-1/2) with one strand of high tensile barbed wire at the top. 6.5 ft tall galvanize-dipped T-posts will be installed 10-12 ft apart and driven to a uniform depth (5 ft remaining above ground) that will allow one strand barbed wire above the hogwire. Hogwire will be installed as close to the ground surface as possible (less than 2 inches) and deadmen will be used when necessary to anchor the wire to the ground. This fence is not designed to be 100% effective at prohibiting Mouflon sheep, however we have never observed sheep in this very wet forest. It is possible that sheep could eventually move into the area, particularly as pressure from hunting in the NPS Kahuku Unit above increases. Our fence design for the Makaalia subunit will take this into consideration when we propose the upper elevation alignment at a later date.

Sign specifications: Approximately 20 signs will be installed throughout the preserve along commonly used trails. These signs will detail preserves rules, give safety precautions, promote

wildfire awareness, and identify restoration sites and management activities. They will mention that funding for this project comes through the State's Natural Area Partnership Program. Sign materials may vary from metal, wood, or plastic. Pursuant to Hawai'i Administrative Rule 13-5-22, no sign shall exceed 12 square feet in area and shall be non-illuminated. All signs will be self-supporting and less than or equal to 8 feet above finished grade.

Back-country camp specifications: Two 10 x 12' canvas tent cabins will be erected upon wood-framed platforms in a remote area of the Kaiholena Unit (in the vicinity of Nanuamaia) to facilitate fence construction and hunting. A small (less than 150 sq. ft.) corrugated fiberglass or tin water catchment roof will be constructed in the vicinity of the cabins and a 50-250 gallon UV resistant plastic tank will be set below the catchment surface. All materials for the catchment system as well as the fences will be flown in by helicopter due to the elevation (4,000 ft) and steep terrain.

Landing zone specifications: Five to ten landing zones will be established in the upper reaches of the forest to assist conservation actions and for fire control and rescue. No single landing zone will exceed 100 sq ft. Landing zones will primarily be located in open and/or grassy locations. If vegetation clearing is required, it will be done with small motorized or hand tools and will not involve bulldozing, grading/grubbing, or ground disturbance. In some instances, it may be necessary to lay wood boards on the LZ for the helicopter skids. All landing zones on State land will be selected after consultation with DOFAW.



Program 2: Invasive Plant Control

Program Goal: To control high priority invasive plants in the preserve, and prevent the introduction and spread of problem weeds to core areas of native habitat where they are not currently established.

This program represents an estimated 30% of the overall effort and budget in this long range management plan.

Habitat-modifying weeds are non-native plants that have demonstrated the ability to suppress regeneration of and/or displace native vegetation. Many weeds become established when an area is disturbed by ungulates, which may also carry and spread seeds. Elimination of ungulates, therefore, may be one of the most effective means of controlling the introduction and spread of many habitat-modifying weeds in the preserve. To complement these efforts, our invasive plant control program focuses on removing habitat-modifying weeds that are already established in the preserve.

The presence of several serious invasive plant species both on and in the vicinity of the preserve has been identified (Table 4). We are currently half way through the process of conducting a systematic, preserve-wide inventory, survey and mapping effort to identify the location and extent of weed infestations. Priority weed maps and a species- and unit-specific management plan are expected to be in place by August 2006. Management efforts will be prioritized according to controllability, proximity to sensitive core areas of the preserve, and along corridors leading into the preserve.

Initial results of the weed survey show a large infestation of strawberry guava and *Clidemia* in the Lower Hilea subunit of the Kaiholena unit. This infestation requires immediate attention. Work in Year 1 will involve determining the perimeter of the infestation and beginning control work (using herbicide) on the outer edge of the infestation and working towards the core. A large infestation of *Tibouchina urvilleana* is located in the Ki'olokū unit. An initial aerial survey has been conducted and will be followed up with ground surveys. Testing different methods of control in attempting to control the perimeter will be addressed in Year 1. Greater detail of these actions will be forthcoming in the weed management plan.

Where possible, we will use an Integrated Pest Management (IPM) approach to weed control. This will include manual methods, mechanical methods (including small motorized tools like chainsaws and weed-eaters) and/or herbicide use, and perhaps assisting with biological control initiatives. Cultural control aspects (minimizing soil disturbance and new pest plant introductions) will be incorporated into routine field operations. Herbicides will be used when they are the most effective method for achieving our long-term goals.

Staff and visitors will follow strict procedures to prevent the inadvertent introduction of invasive plants while working or hiking in the preserve. Our invasive species prevention protocol calls for inspecting all clothing and equipment for seeds before entering the preserve. We will remain

vigilant in our search for incipient populations of invasive plants. Species such as fireweed (*Senecio madagascariensis*), Himalayan raspberry (*Rubus ellipticus*), cat's claw (*Caesalpinia decapetala*), kahili ginger (*Hedychium gardnerianum*), and plume poppy (*Bocconia frutescens*) are found nearby but do not occur on the preserve. *Miconia calvescens*, which has extensively invaded Hilo and Puna up to 3,500 ft elevation, has not been reported in Ka'ū.

Invasive species other than plants (e.g. coqui frogs, gall wasps, koa wilt, etc.) will be diligently surveyed for so that they can be detected as early as possible and responded to rapidly before they are able to gain a foothold. Rats will be controlled on a site-specific basis, as needed for the protection of rare plants.

Table 4. Known Pest Plants of Ka'ū Preserve

Common Name	Scientific Name
Christmas berry	<i>Schinus terebinthifolius</i>
Glorybush	<i>Tibouchina urvilleana</i>
Japanese anemone	<i>Anemone hupehensis</i>
Night-blooming jasmine	<i>Cestrum nocturnum</i>
Palm grass	<i>Setaria palmifolia</i>
Silk oak	<i>Grevillea robusta</i>
Strawberry guava	<i>Psidium cattleianum</i>
Common guava	<i>Psidium guajava</i>

Invasive Plant Control Program Activities

Year 1 (FY2007)

- Create priority weed maps
- Prioritize the most serious invasive weeds and geographic areas
- Develop species- and unit-specific management goals and begin adaptive management of highest priority species
- Participate as a member of the Big Island Invasive Species Committee (BIISC)
- Continue strict inspection and cleaning procedures to prevent introduction of weed species not currently in the preserve

Years 2-6 (FY2008-FY2012)

- Maintain priority weed maps
- Monitor effectiveness of treatments
- Continue adaptive management of weeds and adjust strategies as needed based on monitoring results

- Continue to participate as a member of BIISC
- Continue strict inspection and cleaning procedures to prevent introduction of weed species not currently in the preserve

Program 3: Resource Monitoring

Program Goal: To monitor changes in the integrity of the ecosystems in and around the preserve; to determine whether critical threats to those ecosystems are increasing or decreasing; and ultimately to gauge the effectiveness of our conservation strategies.

This program represents an estimated 2% of the overall effort and budget in this long range management plan.

As an organization, The Nature Conservancy is trying to develop a more consistent and rigorous approach to evaluating the success or failure of our conservation actions. We have established a preliminary framework for assessing the effectiveness of our conservation actions based on the level of critical threats and on several key characteristics of the native ecosystems most greatly affected by them.

At Ka‘ū Preserve and vicinity, we plan to monitor critical threats as above by tracking changes in: (1) ungulate activity and (2) the extent of habitat-modifying weeds. In addition to threat monitoring, we propose to track changes in five attributes of the native vegetation: (1) extent of ecosystem or community type; (2) adjacent land use patterns to native communities; (3) canopy condition; (4) understory condition; and (5) diversity of indicator plant species. In particular, we propose to measure the indicators in Table 5.

Ungulate activity levels will be measured periodically on transects as discussed previously. The number, location, and sampling scheme for these transects will be determined in Year 1. Data collected on these transects provide an index of ungulate activity and should indicate the level of success of ungulate removal efforts. In addition, field staff will also create activity maps from field observations showing the presence of ungulate sign whenever it is detected. This information will direct our ungulate removal efforts where they are needed most.

High priority invasive plant species will be mapped opportunistically during all field operations and systematically when needed. Treated populations will be monitored to determine effectiveness of treatments.

Ecosystem extent, adjacent land use patterns, and canopy condition will be assessed through analysis of aerial imagery and/or maps produced. Some of these data will be available through the Hawai‘i GAP project and some will be interpreted separately because of the coarse resolution in that effort. The frequency and precise methodology will be determined during first several years of the implementation of the management plan.

Vegetation understory and diversity will be assessed using ground-based methods. This monitoring may coincide with ungulate monitoring across landscape transects, or may entail other sampling

methods. Specific sampling schemes, frequency of monitoring, and data collection methods will be determined during the first several years of the implementation of the management plan. Pilot studies at other Conservancy sites (*e.g.*, East Moloka‘i) will help to inform the development of this monitoring component.

In addition, we will continue to work with the Division of Forestry and Wildlife (DOFAW) to monitor forest birds according to the agency’s statewide schedule (*i.e.* every 5 years or so). The last Ka‘ū bird census was in FY2002. The bird data are maintained and analyzed by the USGS Biological Resources Division. Conservancy staff and cooperators will also document incidental observations of rare birds observed while in the preserve.

Table 5. Planned Monitoring Framework for Ka‘ū Preserve and Vicinity

<u>Threat Factors</u>	<u>Indicators</u>
Ungulate activity	<ul style="list-style-type: none"> • Frequency of ungulate sign
Extent of habitat-modifying weeds	<ul style="list-style-type: none"> • Extent of specific weed species
<u>Key Vegetation Attributes</u>	
Extent of ecosystem or natural community	<ul style="list-style-type: none"> • Acres of ecosystem or natural community
Adjacent land use	<ul style="list-style-type: none"> • Percentage of ecosystem boundary adjacent to lands managed for threat reduction or biodiversity conservation
Vegetation canopy condition	<ul style="list-style-type: none"> • Percentage of native canopy cover
Vegetation understory condition	<ul style="list-style-type: none"> • Percentage of native vegetation cover in understory • Percentage of native vegetation cover in ground layer
Diversity of indicator plant species	<ul style="list-style-type: none"> • Percentage and frequency of native, indicator plant species in understory and ground layer

Resource Monitoring Program Activities

Year 1 (FY2007)

- Establish ungulate monitoring transects in all four management units and establish baseline conditions
- Initiate weed mapping and establish baseline conditions of highest priority weeds
- Determine methods for monitoring efficacy of weed treatments

- Determine vegetation monitoring methodology

Year 2 (FY2008)

- Continue ungulate and weed monitoring
- Analyze threat data and adjust management actions as needed
- Determine and/or implement vegetation monitoring as necessary

Year 3 (FY2009)

- Continue ungulate and weed monitoring
- Analyze threat data and adjust management actions as needed
- Determine and/or implement vegetation monitoring as necessary
- Develop and implement a research strategy in concert with the US Geological Survey (USGS) and the University of Hawai‘i (UH)

Years 4-6 (FY2010-FY2012)

- Continue ungulate and weed monitoring
- Analyze threat data and adjust management actions as needed
- Continue vegetation monitoring as necessary
- Continue implementing a research strategy in concert with USGS and UH
- Facilitate Forest Bird Surveys, following DOFAW's schedule

Program 4: Rare Species Protection and Enhancement

Program Goal: To prevent the extirpation of rare species in the preserve, and to encourage research, predator control, and captive propagation of rare plant and bird species.

This program represents an estimated 9% of the overall effort and budget in this long range management plan.

To date, five rare plant species and two rare bird species have been observed in Ka‘ū Preserve (Tables 2 and 3). The Nature Conservancy uses data compiled by the Hawai‘i Natural Heritage Program to identify rare taxa and uses its definition of rare: "species that exist in fewer than 20 populations worldwide." Additional rare species reported from adjacent lands and similar habitats are likely to be found in Ka‘ū Preserve with future surveys.

Protecting ecosystems essential to the majority of the preserve's native plants and animals will be our primary management strategy. Our ungulate and weed control programs are integral to the protection of these ecosystems and rare species. In addition, we will supplement our understanding of the types and ranges of rare plants and animals with surveys to locate other rare species and assess their status, and to document all incidental observations of rare plants, birds, bats, and invertebrates while in the preserve. We will encourage research and provide logistical support to partners interested in specific rare species research and protection efforts.

Rare plant surveys will be conducted by subcontract in Years 1 & 2. Rare species protocols will be implemented, including: securing seed collection permits, working with the Volcano Rare Plant Nursery to deliver any seeds collected for future use (either by TNC or by the State for future outplanting in the same general area). A portion of the NAPP funds will be used to support the Rare Plant Nursery to offset their expenses in maintaining and propagating any collected seeds.

TNC Field Representative, Jon Giffin, has begun working with volunteers to conduct native invertebrate surveys.

Fencing will be installed as needed to protect populations of rare plants from ungulates. Rat control will be conducted as needed.

Rare Species Program Activities

Year 1 (FY2007)

- Conduct rare plant surveys in Kaiholena and Kāhilipali units
- Implement rare species protocols
- Conduct native invertebrate surveys

Year 2 (FY2008)

- Conduct rare plant surveys in Keaīwa and Kīʻolokū units
- Continue implementing rare species protocols
- Continue native invertebrate surveys

Years 3-6 (FY2009-FY2012)

- Protect and monitor rare plant populations
- Rare plant enhancement plans may include small enclosure fences of less than 10 acres around endangered species (see Ungulate Program for fence specifications)

Program 5: Community Outreach

Program Goal: To build Kaʻū community understanding and support for the preservation of Kaʻū's native forests, and enlist volunteer assistance for preserve management.

This program represents an estimated 15% of the overall effort and budget in this long range management plan.

The main objective of our outreach program is to increase awareness of Kaʻū Preserve, the Kaʻū watershed and native ecosystems, their importance, threats, and efforts to protect them. More

specifically, we seek to encourage and facilitate active participation and community pride among the residents of the Ka‘ū District in the effective conservation of this special resource. The key strategies for our public outreach work include a wide variety of programs, including: environmental education, summer intern and youth employment, volunteer, guided trips, community meetings, and hiking and hunting programs, and we will explore the possibilities of campsites.

An important focus will be on the children of Ka‘ū (elementary and high school), the adults of the community, and community leaders. Preliminary discussions with principals and teachers at Pāhala and Na‘alehu schools have occurred and strategies to implement on-site educational programs are being explored. An interpretive nature trail is being developed in the Kaiholena unit. Field activities will combine a mix of conservation projects and educational opportunities. Conservation projects will include trail construction and maintenance, invasive plant control, fencing, creation of demonstration plots, and biological monitoring. Educational activities will address a wide variety of land management, cultural history, and natural history topics.

Community Outreach Program Activities

Year 1 (FY2007)

- Initiate a community outreach and volunteer program

Year 2 (FY2008)

- Continue community outreach and volunteer program
- Implement community-based environmental education program at Kaiholena

Years 3-6 (FY2009-FY2012)

- Continue community outreach and volunteer program
- Continue community-based environmental education program at Kaiholena
- Expand the environmental education program to other Conservancy parcels and to other landowners in the region

Program 6: Watershed Partnership

Program Goal: To assist the long-term effective management of the native ecosystems of the Ka‘ū region by participating in the Three Mountain Alliance, a coordinated partnership of landowners, the State of Hawai‘i, and other partners.

The ‘Ōla‘a-Kīlauea Conservation Partnership recently expanded to nearly 900,000 acres and is now known as the Three Mountain Partnership. With the recent acquisition of the Kahuku Ranch by the National Park Service (NPS), four landowners are responsible for managing nearly 250,000 acres of contiguous lands in the Ka‘ū region (NPS, the State of Hawai‘i, TNC, and Kamehameha Schools). These landowners and additional partners (*e.g.*, U.S. Geological Survey, U.S. Forest Service, U.S. Fish and Wildlife Service), have initiated discussions about the need for a

coordinated approach to information gathering, management planning, and community outreach. By participating in a watershed partnership, the Conservancy is reducing the threats to Ka'ū Preserve while leveraging funding by having partners.

The top three landscape scale management issues chosen by the Alliance to coordinate efforts on first are: feral cattle, fire, and weeds. A proposal for funding the development of a weed management plan has been submitted to the National Fish and Wildlife Foundation. Discussions about strategic ungulate fencing across the landscape have been initiated.

The Three Mountain Alliance Fire Working Group met on October 20, 2005. It was agreed that instead of developing a separate Fire Working Group for the Alliance, it would be better to join and participate with the Big Island Wildfire Coordinating Group (BIGWIG) and to encourage other landowners to participate. This is a better venue for communication because fire response agencies are all represented, including DOFAW and the County of Hawai'i. TNC will be presenting fire planning information to BIGWIG at a future meeting. It was further stressed that fire pre-suppression planning is the most important Alliance role, including: identifying high priority areas and access routes, mapping fuels/fire history, implementing fuels reduction projects, conducting community awareness/education, and assisting landowners with development of fire plans.

Some additional coordinated activities being undertaken by the Three Mountain Alliance are to:

- Define a planning boundary for the watershed partnership,
- Map the physical features and land ownership in the region,
- Determine the need/opportunity for additional partners,
- Develop and sign a Memorandum of Agreement,
- Develop a conservation or watershed management plan,
- Identify and assess primary threats to biological and cultural resources, and
- Initiate a coordinated community outreach program to identify issues and concerns relating to resource management and public use opportunities within the project area.

Funding for these and other coordinated activities , as well as funding for a fulltime TNC Field Representative position for Ka'ū, will be secured through other, more appropriate programs, such as the Watershed Partnership Program, rather than the NAPP. Therefore we are not requesting any funding for our Alliance participation in this NAPP request.

As mentioned in the Ungulate Control Program description above, TNC also intends to increase public access to allow for public hunting. In support of the overall regional management, there would also be increased access to Ka'ū for DOFAW management of the Ka'ū Forest Reserve (e.g. access along the roads to the base of Pu'u One (Kaiholena unit), and access through the Kī'olokū and Kāhilipali units along the Mountain House Trail.

Watershed Partnership Program Activities

Year 1 (FY2007)

- Continue to help facilitate the development of the Three Mountain Alliance

Year 2 – 6 (FY2008 – FY2012)

- Support priority management activities developed by the Three Mountain Alliance
-

Funding

The above programs comprise a six-year management plan for Ka‘ū Preserve with an overall budget totaling \$1,128,252. Through the NAP program, the state pays two-thirds of the management costs for an anticipated total State contribution of \$752,168.

This NAPP request will cover a portion of the costs of the Hawai‘i Island Program staff that will have responsibilities in implementing the management plan. One or two seasonal interns may be hired to assist in implementing the community outreach and environmental education programs in Ka‘ū as the budget allows and project needs warrant. The Personnel line item includes a combined effort of Hawai‘i Island Program staff equal to 2.5 FTE.

Technical and annual planning support is also provided by the Honolulu office of the Conservancy.

In particular, the Conservation Programs Director, Conservation Programs Coordinator, Conservation Planner, Senior Scientist, and other island resource staff help prepare annual plans and reports, develop and implement monitoring and research programs, and establish interpretive and intern programs at the preserve. As budget and needs allow, these support staff members may charge a small portion of their time to this project.

This budget includes various office and project related supplies/materials, subcontract expenses for rare plant surveys, and other miscellaneous project related costs including vehicle expenses both as equipment purchases and equipment lease/maintenance expenses.

Socio-Economic Characteristics

Four types of socio-economic impacts will result from the proposed project:

1) Protection of three important watersheds.

Portuguese Springs is located within the Kāhilipali unit boundary. Ha‘ao Springs is also located within this watershed, makai of the Kāhilipali unit. Plantation Springs is located within the Kaiholena unit boundary. The Keaīwa unit is located within the watershed that feeds water into the Keaīwa Reservoir. The Ka‘ū Preserve units’ location within these watersheds means that they play a key role in the collection and distribution of water into the streams and groundwater. The importance of an intact native forest with all of its layers of trees, shrubs, and plants acting as a break to slow the falling rain cannot be understated. Slowing the impact of the rain allows the thick mats of moss, as well as the soil itself, to collect and slowly distribute water which in turn is used for agriculture and domestic purposes. The growth in population, commercial

services and farming in Ka‘ū is projected to dramatically increase the regional water demand making the protection of these water resources increasingly vital.

2) Support of Hawai‘i’s economy through spending the funds necessary for the proposed actions.

The long-term nature of this program provides a sustained support of Hawai‘i’s economy. The Nature Conservancy on Hawai‘i Island currently employs the equivalent of nine full-time employees who are full-time residents of the island of Hawai‘i. In addition, this program proposes several projects which will require the purchase of items and labor from the Hawai‘i community. Costs will include purchase of fencing material, helicopter operators, paying salaries of preserve staff, vehicle operating expenses, etc.

3) Recreational and/or subsistence hunting.

The objective of our ungulate control program is to eliminate ungulates from 2,600 acres of the Kaiholena Unit and to reduce ungulate damage in the other units. The proposed fenced ungulate-free management area within the Kaiholena Unit, where hunting is currently very limited due to the lack of access, represent less than 3% of the nearly 100,000 acres in Ka‘ū which are currently open to public hunting. In the three other units, strategies to enhance ungulate hunter access to adjacent mauka Forest Reserve lands will be identified and implemented.

4) Public education and involvement in resource protection.

This program also provides the general public direct contact with some of Hawai‘i’s native ecosystems. Through guided hikes and volunteer work parties Hawai‘i’s residents are provided an opportunity to understand the important history as well as the economic benefit of a native forest.

Environmental Characteristics

This project is expected to benefit the environment by maintaining and enhancing native ecosystems, preserving biological diversity, and promoting improved water quality. Therefore the implementation of this project will perpetuate the rehabilitation and health of our native habitat by reducing disturbance by feral animals, and eliminating competition from invasive weeds. This in turn will lead to the long term viability of not only the more common plants and birds, but also the resurgence of many of the rare and endangered plants and birds known in the Ka‘ū forest.

III. IMPACTS RESULTING FROM PROJECT

Resulting Impacts – Positive

- Reduction of ungulate activity in order to promote a sustained and measurable recovery of native vegetation in all management units.
- Reduction of habitat modifying weeds currently in the preserve, and the long-term exclusion of weeds which could threaten Ka‘ū Preserve’s native ecosystems.

- Long-term monitoring and evaluation of biological and physical resources, and adjustment of management activities to reflect positive or negative changes in those resources.
- Logistical and financial support to approved research projects will improve management and protection of resources inside the preserve as well as other critical natural areas throughout the state.
- Protection of biodiversity.
- Prevention of the extinction of rare species.
- Promotion of a more stable water regime both in and below the preserve through the removal of feral animals and habitat modifying weeds.
- Improved water quality (within and below the preserve) by decreasing erosion and siltation of streams through long-term maintenance of an intact native forest.
- Preservation of plants, animals, ecosystems, and natural features crucial to Hawaiian history, tradition, and natural heritage.

Resulting Impacts – Negative

No major negative impacts are expected to result from this plan. However the Conservancy has identified several potential negative impacts:

- The accidental introduction or spread of non-native weeds or other pest species to fence lines, trails, and monitoring transects by staff, volunteers, or other visitors.
- Because herbicides might sometimes be used to control habitat-modifying weeds in the preserve, there is a remote possibility of very limited and short-lived localized soil contamination.
- Occasionally there will be an increase in noise levels from helicopters, which are required for management access to the trackless portions of the preserve. The “prop wash” of low-flying helicopters might also disturb animals.
- Installation of the proposed new fences will require clearing of vegetation along the fence corridor. Native vegetation dominates the landscape and will have to be cut and removed in a swath approximately 4’ wide. The amount of clearing required in a given area will vary depending on the predominant vegetation type, and the amount of previous disturbance.
- Work in the wao akua could be viewed as offensive or culturally insensitive by members of the Ka‘ū community, and impose psychological impacts, including a perception of loss of access implied by a fenceline.

IV. ALTERNATIVES CONSIDERED

Alternative #1: Proceed with the project as described in the management plan. Incrementally build fences within the Kaiholena Unit and remove all feral ungulates from the enclosed areas as quickly as possible.

This is the preferred alternative, as it is the most feasible, and in keeping with the Conservancy's mission. The most significant biological resources occur in the roughly 2,600-acre Kaiholena Unit. Therefore the best and most cost-effective alternative is to enclose this unit by incrementally building fences and remove all feral ungulates from the enclosures as quickly as possible. While increased levels of management beyond what is proposed in the management plan might appear to be a desirable prospect, they are not currently possible due to funding and resource restrictions. The proposed project maximizes the current funding and resources and provides for an effective management of Ka'ū Preserve's native ecosystems.

Alternative #2: No action. A no-action alternative implies neglect of the preserve by eliminating protection from non-native ungulate and weed threats. This would cause the inevitable degradation of its natural resources and result in the reduction of native Hawaiian ecosystems and the extinction of the rare and endangered Hawaiian birds and plants of Ka'ū. The consequence is the loss of the natural heritage of the people of Ka'ū.

V. PROPOSED MITIGATION MEASURES

1. **Equipment Cleaning Protocol** - The Nature Conservancy has developed a comprehensive protocol for reducing the potential for an accidental introduction of non-native weeds into the managed areas. This includes cleaning procedures for all clothing and gear to be used in native habitat; use of separate boots, clothing, and gear for different management areas (depending on the presence or absence of habitat modifying weeds); inspection and cleaning of all items entering native habitat to remove soil, plant material, and insects; and originating all helicopter flights from weed free landing zones.
2. **Herbicide Use Safety Protocol** - Herbicide contamination will be avoided by following herbicide use and disposal protocols. Only extremely small amounts of non-restricted herbicide are used. (Restricted herbicides are currently not used. Restricted herbicides will only be considered as a last resort and then will only be applied according to labeled instructions and Federal and State law.) Application of all herbicide follows labeled use instructions, and concentrated quantities never exceed safe levels. Furthermore, both our Natural Resources Specialist and Field Coordinator are certified by the State Department of Agriculture's Pesticide Branch, and personally trains anyone who applies herbicides in Ka'ū Preserve. Lastly, the use of herbicides would only be employed after it has been determined that other weed elimination methods are not effective.

3. **Helicopter Guidelines** - Helicopter landings will be restricted to designated landing zones. Furthermore, to reduce noise and prop wash, we ask local helicopter pilots to fly higher than 1,000 feet above the forest canopy when traveling over the preserve. The Conservancy reports illegal helicopter landings and low-level overflights to the state Division of Conservation and Resources Enforcement.
4. **Fence Line Route** - Roughly 40% of the proposed alignment for Fence A follows the edge of a pasture, another 50% follows an existing 4WD road so minimal disturbance to vegetation will be required to install and maintain these sections of Fence A. In the more remote section of Fence A, a corridor 4 ft. wide will be brushed to install the fence for a distance of 2,410 ft. A botanist will conduct a rare plant survey and will accompany laborers during the brushing and clearing phase to minimize impacts to uncommon trees and shrubs and re-route the fence if rare species are discovered. Wherever possible, the fence alignment will be routed to minimize the removal of woody vegetation. Additionally, trees greater than 6" diameter will not be cut. All fence construction activities including the clearing of the corridor will be carried out under the direct supervision of trained Conservancy personnel.
5. **Other Hunting Opportunities** - The impact to public hunting opportunities by eliminating ungulates from portions of the Kaiholena Unit will be mitigated by encouraging hunter access to adjacent mauka Ka'ū Forest Reserve lands along the fence corridors.
6. **Access** – As provided by law, appropriate access to the preserve for traditional practice will mitigate the psychological impacts. Three gates will be available for preserve access on the Kaiholena side and fence stepovers will be located and installed as needed in consultation with the community.

VI. DETERMINATION

No significant negative impacts to the environment are expected to result from the implementation of the proposed activities.

VII. FINDINGS, AND REASONS SUPPORTING DETERMINATION

The proposed activities are expected to benefit rare species and native natural communities both in the project area and on adjacent lands. For example, ungulate control will protect rare plants and rare natural communities from browsing, soil disturbance, and the spread of certain weeds in animal excrement. In addition, active weed control in the project area will also help protect rare birds, plants and natural communities by ensuring an intact native habitat. Finally, active management of Ka'ū Preserve will promote a more stable water regime both in and below the project area by reducing the potential for rapid runoff from disturbed and degraded areas.

The risk of major negative impacts is very low. Through a rigorous cleaning and monitoring program, the risk of introduction or spread of new weed species by humans is minimal. Negative management-related impacts on historical resources in the preserve are expected to be negligible. And lastly, the risk of herbicide contamination is low due to the small amounts of herbicide used, the training of all people applying herbicides, and the following of all pesticide labels and state and federal laws.

Findings of the cultural impact assessment indicate that no direct cultural impacts are anticipated, and that psychological impacts related to perceived loss of community access and sensitivity of natural resource managers in areas regarded as sacred can be minimized via protocols to be established in cooperation with community leaders and respected cultural practitioners.

It is anticipated that this project will not have a significant impact on the surrounding environment, and a Finding of No Significant Impact (FONSI) is recommended. This determination is based on the evaluation of the project in relation to the following criteria identified in the Hawai'i Administrative Rules § 11-200-12 and in the OEQC Environmental Review Guidelines.

Significance Criteria

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.

The intent of this project is to benefit natural resources (native plants and animals) protected in the native forest of the Ka'ū Preserve. Some common native plants may be damaged during fence construction, but not to any significant degree. Regeneration of vegetation after removal of ungulates is expected to more than offset damage incurred during construction. A site visit and archeological survey of the proposed fence site by NPS archaeologist Jen Waipa is scheduled to take place on February 23, 2006. All project fences will be placed to avoid historic sites that may be found.

2. *Curtails the range of beneficial uses of the environment.*

The end result of this project will increase, not curtail, the range of beneficial uses of the environment. A more stable water regime both in and below the preserve will be promoted through the removal of feral animals and habitat modifying weeds. Appropriate public use of the area will not be affected. Native cultural resources of highest priority and irreplaceability (living endemic plants, animals and ecosystems) will be protected.

3. *Conflicts with the state's long term environmental policies or goals and guidelines as expressed in Chapter 344, Hawai'i Revised Statutes (HRS), and any revisions thereof and amendments thereto, court decisions, or executive orders.*

This project follows the mandate of the state Natural Area Reserve Law, HRS 195, recognizing Hawai'i's unique natural resources and encouraging that actions be taken which "...preserve in perpetuity specific land and water areas which support communities, as unmodified as possible, of the natural flora and fauna..." The proposed action is also consistent with Chapter 344 and with the State's mandate to conserve threatened and endangered species, as required by Chapter 195D, HRS.

4. *Substantially affects the economic or social welfare of the community or state.*

This project is not expected to have substantial impact on the economy, as there is no present direct significant economic use of the site. Social impacts are expected to be minor, yet positive as the community will benefit from the protection and restoration of this unique example of Ka'u's rapidly vanishing natural heritage, in the form of improved opportunities for nature appreciation, education, cultural practice, and research.

5. *Substantially affects public health.*

Implementation is not expected to create any off-site effects, other than short-term noise generated by small power tools, and occasional use of helicopters.

6. *Involves substantial secondary impacts, such as population changes or effects on public facilities.*

No public facilities will be impacted. No change of population will result from this project.

7. *Involves a substantial degradation of environmental quality.*

The intent of the project is to improve environmental quality by restoring a natural forest system therefore the project will not degrade the environmental quality of the area. Off-site benefits may include reduced soil erosion and watershed enhancement, improving stream and nearshore water quality.

8. *Is individually limited, but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.*

This project is not expected to contribute to any negative, cumulative effects upon the environment nor does the proposed project involve a commitment for larger actions. The formation of the watershed partnership may lead to the development of a regional conservation plan that may address some of these sites, in addition to projects on other private, State and Federal lands, which will allow for leveraging of resources. However, this project is planned independently of other conservation projects.

9. *Substantially affects a rare, threatened or endangered species or its habitat.*

The project will not negatively affect a rare, threatened or endangered species or its habitat. The purpose of the project is to protect a native Hawaiian rain forest and the plant and animal species found therein. Rare plant species in the project area are expected to benefit from increased protection, as could other native species if reintroduced into the area.

10. *Detrimentially affects air or water quality or ambient noise levels.*

Management of Ka'ū Preserve will not affect air quality, as an intact forest helps the environment by absorbing carbon dioxide and, at the same time, provides the oxygen we need. Over the long term, regional water quality may be improved when increased vegetative cover reduces soil erosion. Some noise will be generated during fence construction, primarily from small power equipment and hand tools, with occasional operation of helicopters. This activity will take place only during daylight hours, and far from any residential area.

11. *Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.*

The project is designed to protect an environmentally sensitive area. The proposed project's proximity to fresh water sources (springs) is expected to improve water quality through long-term maintenance of an intact native forest. The proposed project is not located in a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, or coastal waters.

12. *Substantially affects scenic vistas or view planes identified in county or state plans or studies.*

The project will not substantially affect scenic vistas or view planes of the area. The only structures that could potentially be seen in the preserve will be fences and tent cabins. All of these structures will be well below the canopy of the forest, and will be so far from the public view as to be indiscernible.

13. *Requires substantial energy consumption.*

The project will not require substantial energy consumption, but instead will consume small amounts of energy during construction through the use of small power tools and the transportation of materials and crew.

VIII. PERMITS AND APPROVALS

As outlined by the Rules Regulating Application, Approval and Administration of the Natural Area Partnership Program, the final EA, a partnership agreement (contract) and a long-range management plan are submitted to the Board of Land and Natural Resources for approval prior to project commencement. This document is also submitted to DOFAW as an application for a Conservation District Use Permit.

IX. EA PREPARATION INFORMATION

This document was prepared by staff of The Nature Conservancy, in consultation with Randy Kennedy, Christen Mitchell, and Betsy Gagné, staff members in the Department of Land and Natural Resources, Division of Forestry and Wildlife, and Natural Area Reserves System program. The primary EA preparer is:

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This environmental assessment incorporates many sections and figures from Ka'ū Preserve Long-Range Management Plan (*e.g.*, all maps, descriptions of resources, and proposed activities). Please refer to the management plan for details pertaining to the project budget.

X. REFERENCES

Emory, K.P. 1970. Inventory of Archaeological and Historical Sites in the Districts of Kona and Ka'ū and in 'Anaeho'omalu, South Kohala, Island of Hawai'i. Prepared for the County of Hawai'i Planning Department. Department of Anthropology, Bernice P. Bishop Museum. Honolulu, Hawai'i. 53 pp.

Johnson, R. and E. McKinzie. 1981. References to Ka'ū in Hawaiian Poetry: The Celebration of Place in Tradition. Pages 104-107 of unknown book.

Landrum, J. III, 1984. An Archaeological Reconnaissance Survey of Three "Mauka-Makai" Transects within Kanao'a Pu'u'eo Ahupua'a Ka'ū District, Hawai'i. Prepared for the Historic Preservation Office, Hawai'i State Department of Land and Natural Resources. Department of Anthropology, Bernice P. Bishop Museum. Honolulu, Hawai'i. 152 pp.

XI. APPENDICES

APPENDIX 1

COMMENTS RECEIVED DURING CONSULTATION (AND RESPONSES)

During the pre-consultation phase of the writing of this draft EA, thirty copies of the plan were distributed to adjacent landowners, prominent community members and fellow land management agencies and organizations for their review and comment. One comment was received.

1. Bill Gilmartin, Hawai'i Wildlife Fund (via voicemail message)

Comment: The captive propagation of rare plant and bird species is mentioned in the Executive Summary (pg. 2) but does not appear again later in the text of the plan.

Response: In the management plan's next revision some text describing our intention to propagate rare plants and to support the captive breeding of rare bird species will be mentioned in the Rare Species Program description.

APPENDIX 2
KA‘Ū PRESERVE
CULTURAL IMPACT ASSESSMENT

KA‘Ū PRESERVE HAWAI‘I ISLAND

CULTURAL IMPACT ASSESSMENT



Submitted to
The Nature Conservancy

by
Taupouri Tangarō, PhD.

July 20, 2005

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SUMMARY

Dr. Taupōuri Tangarō conducted a cultural impact assessment site survey on May 20, 2005. Consistent with field reconnaissance and local traditional sources, no man-made sites in the forested lands were observed within the preserve. The vast majority of such sites are located in the coastal and lowland zones of Ka‘ū. Dr. Tangarō did not observe any archaeological sites along the surveyed fence route, although he acknowledges the rich assemblage of cultural sites in Ka‘ū District in general. He feels that the physical contribution of the proposed project will be positive, though he states in his Cultural Impact Assessment that some psychological issues may result.

INTRODUCTION

This Cultural Impact Assessment (CIA) assesses the current and proposed forest conservation and management actions of The Nature Conservancy of Hawai‘i (TNCH) on four forest preserve units within the Ka‘ū Forest Reserve, Hawai‘i Island: Kāhili, Kī‘olokū, Kaiholena and Keāiwa. The assessment of these units requires that the physical and psychological role it has on the population of the greater Ka‘ū district, as well as the entire Hawai‘i Island, be addressed.

The time and resources allotted for this CIA has rendered this CIA as an *initial assessment* to ascertain the need for further study (refer to Appendix A); therefore, the focus of this CIA is on the Kaiholena Unit and the impact that the current and proposed fence line will have on the cultural practices contained and extending beyond the geography of the project area.

METHODOLOGY

The validation of this CIA relies on but not limited to the methods delineated by the Guidelines for Assessing Cultural Impacts (GACI) adopted by the Environmental Council of the State of Hawai‘i, November 19, 1997. The following methods of procuring and analyzing information relating to this CIA are:

1. Primary resources: Family histories and genealogies, ethnographic interviews and oral histories, community studies, old maps and photographs, and other archival documents.
2. Secondary resources: Historical, sociological, and anthropological texts and published and unpublished manuscripts.

Delimiting this assessment to secondary resources is in direct result to the time frame allotted for the preparation of the assessment. This places a limitation on advancing on primary resourcing, namely ethnographic interviews and oral histories, that could add immeasurably to the CIA.

The nature of ethnographic interviews and collection of oral histories is such that it would be out of cultural ethics to advance on a rural community of resources without first coming into some acquaintance with said population over a period of time. Non-adherence to this would be out of cultural form and would posit the work in a negative zone. Ka‘ū continues to adhere to tradition and the ethics that uphold these traditions. Historical and current incidences where “outsiders” (non-Ka‘ū-ans) breached the traditions have resulted in degrees of anathema from the Ka‘ū society. This researcher team is sensitive to this fundamental aspect of Ka‘ū traditions and will not violate the norm.

This document will also be punctuated with the primary experiences of this researcher as a practitioner of hula. Because the genesis of Hawai‘i Island hula traditions is Vulcanian, the myth in static form (printed text) and the dynamics of its artistic ritualization (hula) provides an exceptional scope into understanding how primal environments inform practitioners, providing aesthetic form to the art. It will be clearly evidenced that hula is a ritual that profoundly connects a people to their primal environments. I will divulge my personal experiences as a practitioner of the hula Pele (Vulcanian dance genus) as provided by the traditions of Hālau O Kekuhi. Hālau O Kekuhi is a school of hula whose origin is Vulcanian. Ascendants of this hula tradition are Puna and Ka‘ū natives.

Visitation to Kaiholena has provided a degree of cultural protocol required when working with sacred environments. I have walked the entire length of the “Hilo-side” proposed fencing area to ascertain the physical impact of the project on the immediate area.

CULTURAL IMPACT ASSESSMENT

Cultural Sites of the Ka‘ū Preserve Management Units

The Ka‘ū Preserve under the stewardship of The Nature Conservancy is made up of 4 separate units, totaling 3,548 acres of one of the largest areas of intact forest land in the State¹. These units are identified by their traditional names: Kaiholena, Kāhili, Kī‘olokū, and Keāiwa.

A holistic cultural assessment of the impact of TNC’s current and proposed forest conservation and management actions cannot be demarked by the immediate geography of the preserve, but must also include the cultural impact of the residents residing within the district of Ka‘ū as well as the entire Hawai‘i Island, if not beyond. The rationale for this is the fact that the traditional families of Ka‘ū have birthed offspring who now reside outside of Ka‘ū, descendants of Ka‘ū who still know Ka‘ū as home, the incubus of their genealogical origin. This reality of origin is not solely psychological, but physiological as well, for the practice of inserting the piko (umbilicus) of the child into the physical environment is the ritualistic return to the etiological inseparability of native to their native environs, inclusive of land, seas, and skies.

Another rationale for including in this CIA the perspectives of non-Ka‘ū residents is the fact that Ka‘ū is the home of Hawai‘i’s volcano deity Pelehonuamea (Lava of the profound red earth), a deity still honored by many native and non-native residents of this archipelago and beyond. The honor is preserved and perpetuated, in part, through the hula Pele, or the sacred chants and dances of Hawai‘i, whose genesis is vulcanian². Therefore, any physical impact on sacred environs warrants the attention of those practitioners still spiritually connected to the deity who continue to inhabit or who ARE the physical landscape of those environs afore mentioned. Any introduced impact to sacred environments, be it human, vegetable, animal or environmental, will not only physically affect the physical environment to the proportion of the impact, but affect the psyche of those still biologically, genealogically, and culturally reliant and attached to said environment. Be the impact positive or negative, or a combination of both, the final result may not be diagnosed immediately. Careful and deliberate considerations must be based on not just current concerns but the outcomes of meeting these concerns seven generations into the offing.

Cosmology of Hawai‘i the Archipelago

To come into some proximity of assessing the impact of The Nature Conservancy on the culture relating to Kaiholena, Kāhili, Kī‘olokū, and Keāiwa, one must understand the roles these units play in historic and current Ka‘ū. To gain some proximity to understanding Ka‘ū, one needs to see how Ka‘ū relates to the greater Hawaiian cosmos. The myth of origin or the cosmology of Hawai‘i holds all the details essential to establishing the underpinnings of this assessment.

Cosmology establishes a people to a place. Greater than this, cosmology is documentation of how a people have carved out a universe for themselves, hence the Hawaiian term ko'ihonua, to hew out a sacred reality (honua is the sacred earth body of Haumea). Hawaiian cosmology is largely genealogical, establishing a particular genealogical line's right to the paramouncy, the physical link to the natural resources – the pantheon of Hawaiian akua (gods). Oral records, now set to static print, document the milieu creation chants of Hawai'i, establishing Hawai'i the archipelago. In one chant the archipelago is born as a child from the union of Wākea (the Sky) and various female forms of Haumea (the Earth), and another chant documents the migrations coming from Kahiki (distant lands). To the mind of an occident, this may seem paradoxical, but a native sees no contradiction in this.

A creation chant of Hawai'i follows this basic model:

1. Establishment of antiquity as the basis for accrued mana. This is often times metaphorically imaged by being born from the night, from primordial male and female parents. Kalākaua's rite to paramouncy was qualified by his pedigree back to Hāloanakalaukapalili, first male of Hawai'i.
2. The establishment and recognition of the natural resources as bodies of the deities. The Kumulipo creation chant is modular in this, as it lists the simultaneous birth of ocean and land life integral to the organic maintenance of the primal ecosystems, and the sustenance of the human being, as well.
3. The name or dynasty promulgated by the respective creation chant. In the case of the Kumulipo, the name and mana of Ka'īamamao are established.

During the oratory of creation chants strung with seemingly contradictory metaphors, one primary reality is reaffirmed: There exists an inseparability of the native to their primal Hawaiian universe! This is a profound reality, a deep certainty of that which is Sacred, a non-compromising truth to which all ritual, ceremony and religious paraphernalia irreducibly points.

This is not to say that the native Hawaiian was born (or reborn) into the ideal environment with no cause for concerning oneself with its maintenance and organic perpetuity. Exploiting the resources to sustain human life risked significantly the continuance of the universe. Human habitat impacts natural resources, and as these resources are gods themselves, the razing of a forest to establish human habitat, without the prescribed rituals, risked life and living in general. From a mythic perspective the gods are victimized and will then seek vengeance by truncating the life of the human; from a scientific perspective, the forest secures rain that underpins all life. To truncate the life span of a forest is to threaten the water cycles.

To the traditional Hawai‘i native, there is no dichotomy between myth and science. From the native perspective, myth documents empirical, scientific measures for living within a limited and isolated geography symbiotically.

Hahai nō ka ua I ka ululā‘au.

Rains always follow the forest.

The rains are attracted to forest trees. Knowing this, Hawaiians hewed only the trees that were needed.

-Hawaiian Proverb

A mythic/scientific account of Kahina‘aimalama and Kahinali‘i deluge or tidal wave that covered the land after 114 generations of human habitation gives insight into the core understanding of where life originates and is sustained. Although the floods may metaphorically relate to an inundation of foreigners, and presumably the impact on the native environments, there was definitely a threat to the sacred universe. The cult of Kanalu, an ancient order of priest whose primary function was procreation of the Hawaiian, provides insight into the crux of life. Here a prayer for the increasing of the crops to support the burgeoning population post-tidal wave, as prayed by Kanalu himself:

“I am the body forms of the heavens

The thunder

The hidden rain

The hovering rain

The misty-clouded rain

The long cloud

The short cloud

The peeping cloud

The peering cloud

The emerging cloud

In the heavens

Growing, growing

Upland are the plants growing

Increasing the food

For the wide spreading land

Kuei (sweet potato)

Memeua (palili taro)

Sugar cane, banana

And yam pudding

A moku- e, a moku e

Hine [in the ancient language]

Lifted, lifted is the kapu

Freed is the kapu

We are below”³

In the language of mythology, the establishment of the universe, or the macrocosm, is reflected in the social/religious system of its inhabitants. This macrocosm in miniature replication is termed microcosm, or miniature universe. Seeing how the physical landscape reflects the macrocosm and how this is schematized further into ritual art (hula, for one) is to perceive the depth of understanding life systems as lived by Hawaiians. A look into the religious function of hula will provide significant evidence that the macrocosm of Hawai‘i was well understood, and whose organic dynamics were amplified by the guild of hula.

Sacred Features

Maunakea & Maunaloa

The sacredness of Hawai‘i is reflected in numerous ways. For one, our major mountain peaks communicate the sacred union of Wākea and Haumea. Mauna-a-Wākea (mountain of Wākea) is our sky father in the form of the highest peak (13,796 ft elevation) and Maunaloa (mountain of the long journey [of magma]) (13,679 ft elevation). Both mountains are ritualized by hula people and fisher people, to name a few traditional lifestyles still in practice.

Sacred Dance

In hula, the lower body mechanics of the dancer are determined not by the text, but by the beat of the ipu, or the gourd who is the body of Lonomakua, keeper of the flame, kin to Haumea. The footwork in the traditions of Hālau O Kekuhi is primary to the hula and is ideally kept flat on the floor. These earth-bound mechanics are to simply keep the dancer rooted to the earth. This honors the female mountain and her journey of magma from the core of the earth to the surface.

Whereas the footwork is danced to earthbound rhythms, the upper torso and hands reach into the sky, interpreting the chanted text. This honors the male energies of our universe as stoically imaged by the height of Maunakea.

Fishing Traditions

Fishing people, less esoterically, continue the sacred union of male and female in their kū‘ūla shrine practices. The first catch, or for some the best catch is placed in the shrine before two stones: The vertical stone being Kū‘ūla (male) and the horizontal stone being Hina (female). These stones are not representation of the deity but the deity themselves, just as the mountains of Maunakea and Maunaloa are not mere visages of the deity but the physical deity. To deform these sacred environs is to deface the deity, to threaten continued life.

Corridor of the Sun

Another feature that lends to the sacrosanctity of our Hawai'i Island is the red road of Kāne and Kanaloa. Here we speak of the sun's corridor and the perpetual cycle of Ka'onohiokalā (the eyeball of the sun). The sun rises at Ha'eha'e in Puna and sets beyond Pu'uohau, Kona. This corridor is significant to understanding the cycle of living and life systems.

The significance of the rising sun to the hula guild was extreme. By tradition, the dancers cannot enter the stage without first consecrating it. Often times the kumu (teacher) will prepare the stage with a chant, after which the dancers will enter. One of the most used metaphors for the newness of profound reality (which hula is engineered to do) to a people, whether practitioner or spectator, is to "force" the sun to rise and dance to its zenith. One such entrance chant, Ho'opuka E Ka Lā Kai O Unulau, documents the hula traditions of Ka'ū. Unulau and Kauna, name places between south Kona and Kalae, are uttered in this entrance chant. From this distant domain the sun can be seen rising beyond the tip of Kalae and this observance was by no means insignificant, even if it was just a peek.

The setting sun is the metaphor for the waning of the physical life. The chants used for vivification summon the sun to set so that the moon can rise and with it the newness of being reborn from night, from Pō, into the coming of the new day. Kulia e Uli Ka Pule I Mua O Ke Kahuna are the genus of chants that document the setting sun in the west as it relates to vivifying the physical back to life. Therefore, the corridor of the sun is significantly profound to the psyche of the Hawaiian, as it communicates life cycles.

Kīlauea

Understanding sacred cycles and engendering it ritually is a salient theme for understanding the sacred. Kīlauea Volcano is perhaps the most revered because of its cyclic nature: the promise of creation on the reality of destruction. Thousands flock to the eruptions, stepping up onto their own altar of sacred realities and hoping that they leave fully alive and well. Kīlauea is visited by thousands a year because of the primal image of prehistoric creation in the midst of living in the modern world. Here we have the emergence of sacred creations just on the other side of the air-conditioned bus.

Waipi'o Valley

Another sacred environment growing in the face of the current detached-living of modernity is that of Waipi'o Valley. Here the universe is reduced to the length and breadth of the steep valley walls, where the sidereal activity is easily monitored between the peaks, and the cycle of water is the most influential entity of the valley. Waipi'o translates as cyclic waters, and it is here that intercouring with the water cycle is a daily activity. Even my most urbanized university learners have quieted down to a pace conducive to hearing the trickle of water onto the taro leaves. From them comments of having experienced that which is sacred have poured forth.

History of Ka‘ū

**Kū mākou e hele me ku‘u mau pōki‘i aloha
I ka ‘aina a mākou i ‘ike ‘ole ma lalo aku nei**

*We embark to journey with my dearly loved siblings
To a land we have not seen, it’s location to be revealed from below*

Migration Chant of the Pele Clan to Hawai‘i

Archeology

Wolbrink⁴, in his *Resources of the District of Ka‘ū* states that Ka‘ū is “authoritatively recognized” as the original landing of Hawai‘i’s first Polynesians inhabitants, carbon dating as early as 124 AD at Kalae, or South Point. Punalu‘u as the initial landing spot is highly probable. (p. 143). If this information is still current in the year 2005, than the first settlers would studied their new home and the prominent mountain domes that would shelter their new existence. I speak of the mountainous regions of Punalu‘u Mauka, namely, Kaiholena, Makanau, and Pu‘uenuhe, stoic visages immediate to the panorama of Punalu‘u. A long voyage into the virtually unknown would have posited these nature edifices not as hills alone, but the very shrines, abodes of the gods, that sustain life and living. The hills mentioned, as the history unfolds, play significant roles in the molding of the Ka‘ū psyche.

Mythic Documentation

Shark Migrations

Shark migrations to Ka‘ū, in the metaphoric language of myth, are identified as the migration of ali‘i families. Kamohoali‘i was one such shark who guided the Pele clan to Hawai‘i. Mary Pukui⁵, a Ka‘ū native, calls upon her ancestor, Kua, the manō ali‘i (shark chief) as the leader of “a great company of sharks” (p.35) This migration was perhaps after the initial wave of migrants. As Pukui states, the primary migration of Kua on the nine canoes to Hawai‘i mated with the natives producing “Nā mamo I ka halo o Kua” or descendants supported on the fin of Kua (Ibid. p. 36).

The mating of Ka‘ū inhabitants was prolific. Pukui refers to a “tribal slogan” known even to this day, “ho‘okahi nō ‘ohana o Ka‘ū, mai ka uka a ke kai, mai kahi pae a kahi pae” (Ibid. p. ix). The signature welo (characteristic) of Ka‘ū is given here in Pukui’s language:

Historically, the people of Ka‘ū were the rugged individualist of these islands. There are recorded in tradition repeated episodes in which these tribesmen summarily disposed of their High Chiefs when they were weak or tyrannical. The folk of Ka‘ū regarded themselves as one tribe (maka‘ainana), bred from a single parental stock (‘ohana) (Ibid. ix).

Relationship to Environment

It would do well to inquire into the details of this well known story of the three despotic chiefs of Ka‘ū. Analyzing this mo‘olelo (oral history) will provide evidence that the Ka‘ū intolerance for despots is based on the misuse of natural and human resources. This analysis will provide an opportunity to see Ka‘ū not just as “rugged individualists” but a people who understood that mistreatment of natural and human resources risked general life and living. Following is but an abridged account of the details as presented by Mary Pukui⁶:

Hala‘ea is the first ali‘i who burdened his people by requiring all the best i‘a (fish), which he “caroused and wantonly wasting” food that remained. The plot to get rid of him was via a fishing expedition for ‘ahi, or tuna. From Waiahukini to Keauhou all was ready. He along with his people went out, caught the fish, and then later swamped his canoe with all the fish. He drowned.

Ko‘ihala is the second ali‘i that met his fate because of his despotic disposition to his people. He vexed his people by exhausting their energies and resources in the transport of his food from Waiahukini to Kā‘iliki‘ī, then to Kapu‘a, finally arriving at Ka‘alu‘alu. Frustrated, the men ate his food and filled the empty laulau leaves with stones. On disembarking to claim his food, Koihala was stoned to death.

Kohāikalani, the final chief, was disposed of by his kahuna and the people for his tyrannical ways. Selecting the top of Ka‘ulaikalani (about 1,750 feet high) for his luakini (human sacrificial temple) to be built there, where an unnecessary amount of river stones were hauled for paving the interior of the temple (the ocean is 3 miles away). The final ritual was to haul up the ‘ōhi‘a log, the divinity of the temple. The plot was such that the log could not come up the hill without the mana of the ali‘i. Positioned at the bottom of the log, the ali‘i was crushed to death, literally the sacrifice to his own tyrannical ways.

Analyzing this famed story will provide new insights. For one, ocean, shore and atmospheric zones (imaged by the activity on hill tops) are accounted for. This metaphorically communicates that the Ka‘ū native has a holistic concern for their environment.

Hala‘ea, interestingly, interprets as the “passing of breath.” Indeed his ways caused for a waste of breath and energy. The image of “i‘a” or fish is significant. Before the introduction of human sacrifice, the sacrifices were large fish, or i‘a. After the

introduction of human sacrifice, the human sacrifice was still referred to as i'a. This is because the fish is a life form that comes from the depth of the ocean, the ocean being the zone of ancestral connections – hence Kanaloa's reign over ocean activity that takes one from ancestral land to a new home. Human sacrifices afforded the living with the hope that connections to the element or to the tacit zones will not be dissolved but strengthen. Hala'ea was threatening this, wasting the sacrifice of life for his pleasure. Ka'ū had no choice but rid their territory of “the link to the gods,” for this link was weak and direly threatening to their life systems.

Ko'ihala, interprets as to “hew out wrong.” And this he did by exhausting the energy reservoir of his people by busying them with transporting the 'ai and the i'a (the staple and the fish) needed to live. This was analogous to his abuse of resources of ocean and farming products. The imu used to heat up the foods is a ritual of rebirthing the bodies of the gods through the primordial womb for consumption. To treat the ritual of imu lightly is to welcome misfortune. He had to be stoned to death, for his living would result in the consumption of rocks (famine).

Lastly, Kohāikalani interprets as “the crack [of the whip] unto the heavens.” His tyrannical ways were, perhaps, not the transport of rocks three miles from the site but the site itself. The tops of hills are sacred, natural lele, or altars, to where prayers can be directed. To desecrate the top of the mountain is to limit, especially in Ka'ū, the amount of rainfall. In addition, the felling of a huge tree requires the death of a human, the establishing of the carved tree required that the hole to which the tree is to be secured be first layered with another human sacrifice. Here we have two human lives for one tree. To this degree the Ka'ū native understood life. The formula, being then: two human lives for one huge 'ōhi'a. If any life was to be given to this chief's threatening ways it would have to be his own.

Synthesizing this famed story is to see a fine model of the Ka'ū ways of preserving natural and human resources. The threatening of such resources is not tolerated.

Employing Sacred Text to Secure a Kingdom

During the reign of David Kalākaua [1874-1891] songs and chants that would secure his dynasty as the paramount connection to the natural and human resources were collected. The only publication of poetry during Kalākaua's monarchy was an anthology of chants composed for him or appropriated by him (as was his lineal rite) for *their potency in transporting the mana of the song into the fabric of his reign*. This publication, Nā Mele 'Aimoku, Nā Mele Kupuna, a me Nā Mele Pono'ī o ka Mō'ī Kalākaua, Dynastic chants, Ancestral Chants, and Personal Chants of King Kalākaua I⁷ documents the natural resources and energies of Hawai'i Island and Ka'ū district that were relied upon to strengthen the reign of Hawai'i's last King. Following is an anthology of portions of these songs (the interpretations are mine):

“I Hawai‘i hua kanawao o ka lā‘au ali‘i
Ka maile ‘li‘i mia ka wao eiwa...” (p. 4)

*The forest of chiefs seeds in Hawai‘i
The small leaf maile of the uninhabited regions of the six districts*

“E ola Hawai‘i ka moku
‘O ka ‘oni ‘ana a ke kanaka ola
E ola ‘o Kalākaua ke ali‘i nona” (p. 22)

*Life to the island of Hawai‘i
A life to give animation to the living person
May Kalākau live a chief belonging to life and land*

“Ha‘alulu luna o Kaiholena
Ka papa o kau mai ka ‘ohu...
Hele piha a‘o Ka‘ū
O ka ipu o Kapāpala...
Ua wali wale, ‘a‘ohe nao
I ke kū‘ai nā i‘a
‘O ka po‘e nana i kia‘i
‘O Ka‘ū nui kua makani
‘O ka hū o ka maka‘ainana
‘O ka maka‘ainana nui po‘o kua kea
Ka pē mahi‘ai o Ka‘ū...” (p. 59)

*The sky above Kaiholena quivers (with rain)
The foundation for the mist to mount
Ka‘ū becomes stocked [with resources]
The food gourd of Kapāpala
The rain has made the soil soft, nothing left to do
But to exchange for fish
The people whose job it is to steward this
Are those whose backs are accustomed to the wind
The overflowing of residence
The citizens whose heads are whiten with wisdom
The dew-anointed farmers of Ka‘ū*

Religion of Ka‘ū *Primal Religion*

To understand the religion of Ka‘ū is to have some comprehension of primal religion, or the religious beliefs and practices that are intrinsic to a given geography, a system that cannot be exported like the universal belief systems of Buddhism, Christianity and Muslim belief systems. Primal religion is the sacred reality of a human who is physically and psychologically rooted to a specific geography, and whose ancestors are not “found” in the sky, land and oceans, but rather, who are the sky, mountain and oceans. Concretizing this reality is the practice of inserting the umbilicus of a new born into the rocks, oceans, and mountain pools as a form of birth certificate certifying that the child is a biological product of that environment.

Animism of sacred environments is not a belief that one may or may not subscribe to in primal religious systems, it is a profound reality inherited at conception. Counter to understanding Primal belief system is the incursion of foreign belief systems upon the interpretation or translation of the Hawaiian belief system. Given that parallels may be had, the primal religion of Hawai‘i is unique in that it cannot be found anywhere else outside of Hawai‘i.

As the entire universe of Hawai‘i is sacred, island offspring of Sky and Earth, there was really no place one could escape from intercouring spiritually with the environment. With the development of social order came also the need for concentrating as well as formulating forms of worship. Whereas the natural environments were the primary abode of the gods, the heiau, or human-made temples, were themselves a microcosm of the macrocosm, or minute duplication of the greater universe to where the attention of a particular deity may be directed to or from. There are twenty-nine heiau listed for the Ka‘ū district⁸.

The Establishment of Deity

The venerable resource on planting traditions of Hawai‘i, *Native Planters In Old Hawai‘i, Their Life, Lore, and Environment*⁹ puts forth a theory of the introduction of the male religions of Kāne, Kanaloa, Lono & Kū to the domain of religion in Hawai‘i. This theory here is not without argument, but provides, nevertheless, an outline to the domain of organized primal religion of Ka‘ū.

Kāne & Kanaloa

For one, because the cosmological records of Hawai‘i establishes the names of Kāne and Kanaloa first, this signals the probability that these religions were established earlier, and in addition to this is the probability that the kinolau of these deities, namely taro, banana, sugarcane and bamboo, were the first foods that came with the earlier migrations (p. 15). If this be the case, than for the first wave of Polynesians arriving on the shore of

Punalu‘u, the natural features of the land as they relate to resources would have been seen in the visages of the new environment. Kaiholena would have been perceived as an altar of Kāne and Kanaloa in its phallic form, and in the case of Kāne and Kanaloa whose collective signature contribution to life is fresh water, than the green uplands would have signaled the livability of living in the lowlands, albeit dry and arid.

Kū & Lono

Following would have been Kū and his forms of coconut and breadfruit, after which Lono and his form of sweet potato, ipu and the hog followed. Polytheistic belief systems allows for one physical feature to be rededicated to another deity, as in the case of heiau who service as māpele (farming) only to then emerge as a luakini (human sacrificing) as deem necessary by the Paramount. With the wave of established society (the contribution of Kū religion) sustained on an agrarian livelihood (as established by the Lono migrations), the interior of Punalu‘u mauka would have then been accented in the names the newer gods, or at least shared with that of the older gods, of Kāne and Kanaloa. Transference of the accent of rain deity of Kāne to that of Kū is not unreasonable in primal religion. Kūmauna, the current local rain deity (also found on Kaua‘i) is perhaps an element of Kū overtones of what may have once been predominately a Kāne and Kanaloa domain.

Interestingly, Lono embodied in the farming system and in vegetable and animal forms, such as the ipu sweet potato and the caterpillar, takes a very high station in the traditional Ka‘ū family system. For one, the spread of the population of Ka‘ū is documented in myth language as having stemmed from a gourd, the body of Lono. To this reality, every male child is dedicated to the god Lono after weaning from the females of the family. (Pukui, 1998, p. 96).

Mergence of Kū & Lono

Another myth documenting the religion of Ka‘ū is likewise dedicated to the esotericism of the Kū and Lono cult factions. I speak of the famed Kumuhea, or Caterpillar god. Kumuhea, whose father is Kū, translates “From which source.” Kumuhea marries a girl from Ka‘ū and makes their home on the hill now so named Pu‘u’enuhe, or Caterpillar hill. In short, Kumuhea is nocturnal in activity, eating all the sweet potato leaves and providing it as the only food for his wife. She eventually waifs close to death. Her brothers take revenge and he is chopped up to pieces, which eventuated not into the death of Kumuhea but his deification as a god. Analyzing this document is to see the emergence of two male gods dealing with systems of society and systems of agriculture, the two gods that continue to reign heavily in the district under study.

To the ritualist, the caterpillar whose name translates “From which Source?” and coming up nocturnally to feed speaks of the ritual of metamorphous, from a ground crawler to air flyer in the form of the pulelehua or lepelepeohina, or butterflies. The description of the mass peregrination of the caterpillars to the ocean speaks of cycles. Whereas some caterpillars would make it to the ocean and become food for the ocean life, others would metamorphous from caterpillar to butterfly. It is significant to the intricacies of primal

religion that one of the two terms for butterfly is *lepelepeohina*, or the Fringes-of-Hina. Hina is the female counterpart of Kū. In conclusion, this myth may be documenting the facts that the onetime dominant Kū religion found sustenance off of the Lono agrarian lifestyle, hence the coexistence of Kū and Lono as reflected off of the caterpillars eating off the leaves of the potato but sparing the corm.

The Fire Clan

Regarding the establishment of the Pele clan in Hawai‘i, various records exist. King Kalākaua¹¹ states that the Pele clan arrived about A.D. 1175 to Ka‘ū. He writes:

“The Pele family was neither connected with, nor controlled by, the supreme gods of Hawaiian worship, nor was it a part either of the ancient or later theocracy of the group, as brought down by the priesthood of Hika-palaoa, the godhead and trinity of original creation. It was an indigenous and independent development of the twelfth century, until which period the family was unknown on Hawai‘i...” (139)

He continues:

“The Pele family came to Hawai‘i during the reign of Kāmīole, the usurper, from one of the southern islands – probably Samoa – in about the year A.D. 1175... The head of the family had fallen in battle, and Moho, the eldest of the sons, assumed the direction of what remained of the once powerful household” (p. 140).

Kalakaua (Ibid.) presents further detail of the clan and their associations with Ka‘ū (p. 140, 141):

- The clan first landed at Honu‘apo, Ka‘ū
- Settled in the valleys back of Keauhou, among the foothills of Mauna Loa
- Moho and Kamakaua are her priestly brothers
- Ulolu, Hi‘iakaikapoliopole’s name before the apotheosis
- Kānehikili and Kamakaua (brothers) were reported to be hunchbacks, but skilled warriors.
- Pele and family lived in a cave at Keauhou that trickled water

Another Ka‘ū migration chant of the Pele clan to Hawai‘i calls upon Kū and Lono as bailers of the canoe, suggesting a humble station, a station not yet elevated to the status of Great Gods reigning over social order and agrarian livelihood. This perhaps implies that a very early migration of the Pele clan, preceding that of Kalakāua’s “Apotheosis of Pele,” may have established themselves in Ka‘ū. Support to this is the fact that this one Ka‘ū chant speaks of the Menehune coming along with Pele, the menehune long being considered the aborigines of the land. The following chant of the Pele clan may therefore precede the male-dominant migrations¹²:

Mai Kahiki mai ka wahine 'o Pele
 Mai ka 'āina o Polapola,
 Mai ka pūnohu a Kāne
 Mai kea o lalapa I ka lani, mai ke ao 'ōpua.
 Lapakū i Hawai'i ka wahine 'o Pele.
 Kākai i kona wa'a Honua-i-ākea,
 Kō wa'a, e Ka-moho-ali'i, holoa mai ka moku.
 Ua 'oki, ua pa'a ka wa'a o ke akua,
 Kō wa'a o Kālai-honua-mea,
 Holo mai ke au.
 Hele a a'e a'e 'o Pele-honua-mea,
 'A'e a'e Kalani 'ai punia mai ka moku.
 'A'e a'e kini o ke akua
 Iā wai ka uli, ka hope o ka wa'a, e nā hoa'li'i?
 Iā Pele-a-'ehu, a Menehune.
 Ka 'ia ka liu, ho'ōnoho 'ia kāu hoe iluna o ka wa'a
 'O Kū mā lāua ' Lono.
 Holo ai ka honua 'āina kau i ho'olewa moku,
 'O Hi'iaka noe'eau he akua,
 Hele a'e a kōmi i ka hale o Pele.
 E huahua'i i Kahiki, lapa uila e Pele,
 E hua'i, e hua'ino ho'i a.

*From Kahiki came the woman Pele,
 From the land of Polapola,
 From the rising reddish mist of Kāne,
 From clouds blazing in the sky, horizon clouds.
 Restless desire for Hawai'i seizes the woman Pele.
 Ready-carved was the canoe, Honua-i-ākea,
 Your own canoe, O Ka-moho-ali'i,
 For sailing to distant lands.
 Well-lashed and equipe, the canoe of high gods,
 Your canoe, Sacred-hewer-of-land,
 Stood ready to sail with the ocean current.
 Pele-honua-mea embarked, the heavenly one
 Stepped aboard to sail around Kahiki island.
 Multitudes of gods came aboard.
 O royal companions, who handled the steering paddle at the stern?
 Pele-the-redhead herself was helmswoman, ruler of the Menehune.
 Kū and Lono bailed out the bilge water,
 Carried paddles, placed them in station.
 Hi'iaka, the wise sister, next embarked
 Boarded the craft to dwell with Pele in her sailing quarters,
 Close to Pele on the long voyage.
 Jets of lava gushed from Kahiki.
 Pele hurled her lightning,
 Vomit of flame, outpouring of lava was the woman's farewell.*

(p.53-55.Pukui translation)

The religion of the volcano goddess is perhaps the most evident in modern Hawai‘i. Considering that hula is a sacred art form with religious import, the dances relating to Vulcanian activity, that is ever so popular still in the modern guild of hula, is the artistic form of this religion. A glance into the Vulcanian practices of hula will produce an exemplary model for how the native religion engendered with accuracy the organic ordering of the Hawaiian eco-system, to the point of ritualizing the connection whereby the practitioner becomes a physical incarnate of that sacred environment.

Ritualizing the Cosmos Through Sacred Dance

In order to see how intimate the native Hawaiian was to their environment is to see this intercourse with the numinous environment through the practices of the hula Pele. The practitioner of the hula Pele was far from just dancing “about” Vulcanian activity; the dancer became, through possession, the Vulcanian environment! This phenomenon was, again, not isolated but a regular occurrence for the practitioners of the hula Pele. In fact, the epic chant of Malaeha‘akoa¹⁴ is punctuated with the plea “‘eli ‘eli kau mai!” or to possess me profoundly [so it is you and not I that accounts for this].

Furthering the evidence of the hula Pele being borne not from a mere mimesis of earth’s movements and vibrations but from the total consumption of the practitioner by these elements is the chant Kānehunamoku¹⁶. A chant referencing Ka‘ū placenames, the origin of this chant is that Pele herself, through a medium, chanted it (p. 8). The point here is that possession of human by the deity is not foreign or isolated, but a regular part of the traditional Hawaiian living intimately with their numinous environments.

Hi‘iakaikapoliopole, on the shore of Nānāhuki, Puna, Hawai‘i when asked to dance, first placed lei of lehua blossoms (whose seeds are airborne) on her person and then allowed for the makani (wind) that brought hypnotic movement to ocean currents and pandanus groves to consume her, leaving her entranced by the pneumatic energies of the wind. Here Hi‘iaka was consumed (‘ai) by Kāne in his wind form¹⁷, becoming the haka, or medium, from which the immediate geography found incarnation. This was the birth of the sacred primal dance of Hawai‘i.

Analyzing the genesis of hula is enough to underpin the point that the native Hawaiians amplified their complete understanding of their universe, to the point of ritualizing it through their person. In general, wind is a kinolau (body form) of the male deity Kāne, who in other forms (as in the airborne seeds of the lehua blossom) are always integral to the dissemination of airborne seeds, like ‘ōhi‘a, as well as catalyzing spiritual awareness. Having passed from the temporal into the spiritual, Hi‘iaka was not in mimesis of the environment; Hi‘iaka was consumed, wholly possessed by the environment and became an incarnation of it, a microcosm of the macrocosm. Her transformation was so profound that its radiation subjected Pele into the deep sleep that launched the epic journey of Hi‘iaka’s maturation from mortal to immortal.

While some hula schools have secularized hula, other hula schools still adhere to this antiquity of nature spirit possession through hula, although never blatantly addressed. The facts supporting this reality are not in the verbal articulation of the sacred craft but in the text of the mele oli (chanted text) and mele hula (text for dancing), as well as in the transmission of the instruction and traditions of that particular school. But how does hula and its ability to serve as portals for the incarnation of nature spirits reflect the macrocosm, or the greater universe?

Hula Pele (dances honoring volcanic activity) produces heat and water, the catalyst being the wind! Here the body of the dancer or chanter now becomes a miniature of the greater universe, for now the catalyst of wind (breath) is promoting the production of body heat and sweat. The production of sweat through dance is so sacred that what ever comes into contact with the sweat (hula regalia, adornments) is now consecrated to the phenomenon of cosmic oneness. To allow for others to come into contact with the sacred articles risks the practitioner's association with the school. This is real for the school of Hālau O Kekuhi, whose genesis is in Vulcanian connections. To peruse the chant text of the Pele traditions one will see how basal wind, fire and water is to the promotion of this intimate understanding of primal oneness. The last element is earth, and this is our physical bodies, or our honua, undergoing the ritual of liminal transformation through hula.

In the traditions of Hālau O Kekuhi, from whom my hula knowledge stems, a requisite for the execution of especially the hula Pele is the 'aiha'a. 'Aiha'a means to be consumed by possession. The ideal body for possession is one that is warm and not cold, and one that produces water (sweat). In fact, the kumu will watch for the hint of sweat at the sternum, or houpo, before beginning the instruction or performance of the hula. Again, salient and basal to the ritual of profound connections through the hula Pele are the following:

1. The kinolau, or body forms of the nature deity in the form of lei and other non-vegetable adornments hoa (lashed) onto the dancer's body.
2. The catalyst of the hula experience is in the voice, or the breath of the chanter giving life to the sacred text. For the 'ala'apapa dances honoring Pele, the breath in the voice is doubled by the breath emitting from the ipu. The gourd in many Hawaiian myth traditions is the receptacle of the wind. Although the gourd is a Lono body, the wind it produces is a Kāne wind form. So again, as with Hi'iaka, the wind kinolau of the god Kāne is the catalyst toward transformation.
3. The body of the dancer is in a perpetual bent-knee position with straight spine alignment. This positioning heightens the body temperature. Here the element of fire is kindled.
4. Sweat is finally produced, the element of water from our own internal reservoirs. The rise of the water through our pores feeds the forest gods, as living in and through the lei. After the performance, the lei is never worn again and returned back to its environment and with it our sacrifice of sweat. This reality is so profound that any contact of non-dancers to the articles of

person of the dancer having come in contact with the sweat threatens the connection of the dancer to the school.

5. Lastly (or perhaps, firstly) is the dedication of the body, the person of the practitioner, to the ritual of liminal transformation. The body is consecrated, dedicated to a particular focus: to be inhabited by the deity called! Preceding the transformation through hula, the practitioner is required to abstain from acts that will defile the body, the abode of the deity.

This example of the “little universe” as miniature incarnations of the greater universe is amplified throughout the traditional life style of the Hawaiian, and not exclusive to hula. But to this degree, the native mind knew their environment, their universe intimately, to the degree that it was ritualized in every aspect of living. Living outside of this reality is a direct product of foreign influence. With Ka‘ū as the home of the deity herself, and living within an active volcanic environment where life and death was invincible, does foster a heightened sensitivity for place and profound living. It is with this reality that the Ka‘ū native of today lives.

IMPACT ASSESSMENT

Kaiholena Unit

Cultural Perspective

Kaiholena is in the ahupua‘a of Hīlea. In the early 1800’s, there were numerous plantations in the Hīleanui ahupua‘a, and the village of Hīlea itself was prosperous. Here grew dry taro, sweet potato, sugar cane and banana. Below Makanau and Pu‘uiki were extensive plantings of the mamaki variety of mountain taro, Hīlea’s famous crop (Native Planters, pg. 610). Here, again, bananas were grown, in addition to arrowroot, turmeric, yams, paper mulberry, ‘olonā and bamboo. This area was “probably the single richest inland area for native horticulture before it became depopulated” (Ibid 610). The lands between Makanau and Pu‘u ‘Enuhe, and beyond these two hills “toward the mountain” were said to have been “extensively cultivated” (Ibid 611).

Kūmauna is the local deity of rain in the Hīlea vicinity. In his mineral form of a huge rock, Kūmauna (an extension of the great god Kū) continues to play a heavy role in the psyche of the Ka‘ū people. It is interesting to note that Kūmauna is also a rain deity of the island of Kaua‘i.

Kūmauna is credited for growing the iholena variety of banana. At the base of Pu‘u Kaiholena (N19°09.775’ W155°34.910’ elevation 1960’) are the remains of what obviously could have been an extensive plantation of the iholena variety banana, perhaps the remains of Kūmauna’s plantation (see Appendix B, Bill Hanson report).

I first was introduced to this stand of iholena by Ka‘ū resident Pele Hanoa in around 1998. From her I learned that this small stand of iholena was indeed sacred, as it was planted by a god and only found in this vicinity. She also communicated the inseparability of Pu‘u Kaiholena and the iholena banana, although she didn’t go into detail. This stand of iholena is a significant cultural site, in that the banana is primarily a kinolau of the god Kanaloa, god of tacit connections. The pōhuli, the sucker of the banana, literally translates as ‘to search in the dark,’ a reference to subterranean journey. The destruction of this landmark would weaken considerably the psyche of many of Ka‘ū’s culturalists who still know of the grove and its mythic origins.

Culturally, Kaiholena stood as the prominent physical feature of Hīlea, Nīnole, Wailau and Punalu‘ū ahupua‘a. Its elevation, 2000’ at its base, rising to 3,723’ in height, places it in the wao ‘ilima and wao kanaka regions, which allows, in theory, for access without the protocol deemed necessary for the areas above the 5,000’ elevation. However, mountains, hills, and natural rock formations at *every elevation* were held in high sacredness, as this would be the abode for the gods, where humans would have to approach only under the protection of protocols of prayer and ritual similar to that of the wao nahele and wao akua regions. The chants perused for Kaiholena associations speak of the entire Kaiholena as a remote and sacred place, where the gods dwell, a feature associated with “fetching” water, and thereby imbued with the mana necessary to provide an ideal life in Hīlea.

Kaiholena is translated as indolent, one that is lazy. Lazy in this sense refers to the ease of life when water is available. Here is a traditional proverb relating to Kaiholena:

“Aia aku nei paha I Kaiholena”
Perhaps gone to Kaiholena
(Perhaps gone to loaf somewhere.
A play on lena (lazy))

The chant for Kalākaua positions Kaiholena as the “person” that titillates the heavens until rain is secured, a source that allows for Ka‘ū to be stocked in food and experience some respite from toil:

“Ha‘alulu luna o Kaiholena
Ka papa o kau mai ka ‘ohu...
Hele piha a‘o Ka‘ū
O ka ipu o Kapapala...
Ua wali wale, ‘a‘ohe nao

The sky above Kaiholena quivers (with rain)
The foundation for the mist to mount
Ka‘ū becomes stocked [with resources]
The food gourd of Kapāpala
The rain has made the soil soft, nothing left to do
(Refer to p. 11 for complete text)

Another point to make is that the ‘lena’ is a yellowish color. Hula people, as well as other practitioners of Hawaiian culture, continue to use ‘ōlena, or turmeric for spiritual cleansing rituals. The ‘lena’ in relationship to Kaiholena may be seen as the descent of purity for living – the rain. The rain in ceremony is still a vital omen for the success of focus. It could be said that the rain falling over Kaiholena was the ‘ōlena rain that would purify life and living.

The names of the surrounding ahupua‘a also speak of rain, its cycle and the ease of life it brings.

Hīlea also appears as Hi‘ilea in some older maps. This translates as “Lea supports.” Lea is the goddess in association with selecting wood for canoes for migrations and ocean sustenance – hence one name having associations with fertility of earth and access to ocean resources, respectively. To this degree the natives understood their environment and functioned within the framework.

Nīnole literally translates as ‘bending.’ Seemingly a little abstract in the schema of water and water cycles, the history of Nīnole has a little story that gives light to the meaning of its name. Here at the many springs that are associated with Nīnole lives a cannibalistic mo‘o named Kaikapū. Her beautiful granddaughter would lead travelers into a cave

where her Kaikapū would eat them raw. This story is a metaphor for the life-giving properties of water and the reciprocation of humanity to this source. Here we have a mo‘o (water deity) eating humans who venture near her springs. This “life for life” ritual is very common in Hawaiian practices. Hence the “bending” of Nīnole is the actual ritualistic return back to the source.

Wailau and Punalu‘u are obviously related to water. Wailau translates as ‘innumerable water sources’ and Punalu‘u means to “dive for spring water.” In association to Punalu‘u is the honu deity Kauila, a protectorate of children of that area. The honu is a kinolau, physical manifestation, of the god Kanaloa. And as the springs are fed from mountain sources, here we speak of the older established gods of Ka‘ū, Kāne and Kanaloa whose primary function was to establish freshwater sources.

Impact Assessment

The entire Pu‘u Kaiholena is sacred. It is sacred because it physically is itself a magnet to atmospheric moisture. It is sacred because the absence of Pu‘u Kaiholena and the forest of Pu‘u Kaiholena would alter the living conditions so severely as to make living in these areas truly difficult. The ancient people knew this and therefore left the forest of Pu‘u Kaiholena intact.

I have entered Pu‘u Kaiholena on foot along the proposed Hilo-end fencing project. I have seen the negative impacts of ungulates and invasive plants on this immediate area. Fencing off Pu‘u Kaiholena as well as eradicating, on a regular basis, any and all invasive plants are recommended to maintain this intact forest environment. This recommendation is for immediate address, for delaying actions will only make recovery and maintenance challenging and costly.

In addition to the Hill of Kaiholena is the last known stand of the iholena banana, which is highly significant culturally. The decimation of this by human, animal or plant invasive impacts needs immediate addressing. Fencing, signs educating passerby and eradication of invasive plants are measures that may immediately reduce the negative impact on this stand of bananas. See Appendix B for site location.

The positive impact of keeping the forest of Kaiholena intact as well as the banana stand is immeasurable for a people whose entire existence is founded on an intimate relationship with their natural environment. **Every Hawaiian plant, animal that has a name has a function in the universe of the Hawaiian.** This reality cannot be gauged thoroughly after greater than 200 years of foreign influence; however there is a growing population of culturalists and scientists giving validation to the traditional knowledge of environmental concerns as practiced by the ancients. The absence of their sacred environment is to exile the Hawaiian into a space of spiritual disconnectivity.

As regards to “major negative impacts to cultural resources,” the physical contributions the proposed fence will make to Kaiholena are positive in my estimation. However, psychological issues arising from placing a fence in sacred territory and having this

sacred environment managed by “outsiders” may (or may not) present itself in the offering. I think that educating the whole district regarding their natural resources will ameliorate any concerns regarding “intruders” into sacred environments as well as providing an avenue for provincial districts to learn of and actively support The Nature Conservancy programs in and beyond their traditional boundaries.

To the traditional Hawaiian there is no dichotomy of physical and psychological environs: physical environments give shape and breath to Psyche. This inseparability between the two zones is that which gives birth to Sacred Realities. To step into their sacred environments is to trample on their psyche. The Hawaiians have the best time-tested methods for preserving this balance and it will do TNC well to apply them to their projects in Hawaii.

The 1970 “Inventory of Archaeological and Historical Sites in the Districts of Kona and Ka‘ū, and in Anaeho‘omalu, South Kohala, Island of Hawai‘i”¹⁸ does not list Kaiholena in the inventory of historical sites.

Kāhili, Kī‘olokū and Keāiwa Units

The following information is from The Nature Conservancy’s Long-Range Management Plan, Fiscal Years 2006-2011.

Kāhili (Kāhilipali) unit ranges in elevation from approximately 2,400’ to 2,640’, placing it in the traditional zone of the wao ‘ilima and wao kanaka. The sacredness associated with this place is that it was named after a priest of this same name. Most of this unit contains ‘ōhi‘a and uluhe.

Kī‘olokū unit ranges approximate elevation from 2,400’ to 2,700’, placing this in the traditional zone of wao ‘ilima and wao kanaka. Like the Kāhili unit, this unit has ‘ōhi‘a and uluhe.

Keāiwa unit is approximately 3,200’ in elevation, rising to approximately 5,700’, traversing the wao kanaka, wao nahele and wao akua zones. Keāiwa (sometimes spelled Keaīwa) is associated with miraculous healing powers. Entering into Wao nahele and wao akua was prohibited but to a few traditional occupations. Prayers and sacrifice were required as reciprocation for entering into sacred territory.

I have not visited the units listed above either by air or ground transportation; therefore mitigating the physical and cultural impacts at this time are limited to signage and regular opportunities for community groups and families to actively engage in the removal of invasive plant and animal species.

The 1970 “Inventory of Archaeological and Historical Sites in the Districts of Kona and Ka‘ū, and in Anaeho‘omalu, South Kohala, Island of Hawai‘i”¹⁹ lists Kāhilipali on its inventory (p. 8), but its abstractions of petroglyphs are along the “coastal trail” and hence out of TNC unit of Kāhili. This SHPD report does not list Kī‘olokū and Keāiwa, and Kaiholena.

RECOMMENDATIONS FOR MITIGATING IMPACT

Mitigating the Physical Impact

Mitigating the physical impact of the proposed fencing (Hilo side) in the Kaiholena unit is minimal. I've walked the length of the proposed fence line (the Hilo-end) and found that the initial hand-clearing (along the existing 4-wheel drive road) was done sensitively. Fencing the banana stand, likewise, would make a minimal impact on the physical landscape, as the land surrounding the banana has been cleared previously. The current fence line separating the cattle grazing and the forested area should continue and be maintained.

Signs educating visitors about the mission of The Nature Conservancy is one step in mitigating the impact. Opportunity to participate in the eradication of invasive species, as well as inviting groups or families to assist in the fencing projects may mitigate territorial/cultural concerns by allowing Ka'ū residents to actively participate in conserving their forest.

Mitigating the Psychological Impact

Mitigating the psychological effect of the fence line in sacred environments warrants concern and action. To the Hawaiian, there is, again, no dichotomy between what is physical and psychological. To enter into sacred zones required the prescribed rituals that would insure that both parties, the forest and the human, would not be endangered. Entering into the wao akua or forest was done by but a few traditional occupations – bird catchers, canoe builders, temple artisans, and hula people.

Hawaiian Methods

The equipage necessary for entering and exiting these zones were significant to the occupation, and proselytes to the occupation were never allowed to trample in the forests. One of the protocols was the mele komo, or chants asking permission to enter. These chants followed a basic format:

1. address to gods
2. establishing the relation to gods (be it genealogical or occupational)
3. stating the exact purpose for entering (picking kinolau for hula shrine, feathers for capes, a log for canoes, etc)
4. for what ideal result (so that the gods may thrive in the hula school, so that the chiefs may have access to heightened awareness through the feathers, so that the family can be fed by a fishing canoe, etc.)
5. Statement of reciprocity (please help me live so I can help you live, I offer you my dedication to the art, I leave you a fish, I send off to you my sacred breath, etc.)

A model prayer for establishing the fence line would look like this:

1. To you the sacred domain of the gods, to Kaiholena
The rain-attracting-forest of Kāne and Kanaloa
Where the 'ōhi'a supports the reaches of 'ie'ie
I call unto you for your guidance
2. I am a native/resident of this land
I know the taste of your water
3. I have come to protect your domain
From the seed carrying pig of foreign stock
A fence will separate the sacred from the profane
The lobelia from the kuaiwī
The 'I'iwi from the mosquito
4. So that your continued life may sustain that of me and my
Family
5. In return for this duty of love I offer my sacred breath in song
As I clear my shoes of seed
Grant me entrance into your domain
And know that I am who I am
A product of water trickling off your mountain
My prayer is sent.

Companion to the protocol for entrance is the chant for exiting. This chant insured the environment that all work is complete and it is time to leave. Chants for exiting were usually much simpler, but its profound impact on the psyche of the individual is not to be minimized. The forests are known to be consuming, as was the famed human-consuming forest of Pana'ewa in Hilo. If the appropriate chant for exiting was not uttered the threat to the human was inevitable. The threat may not be physical more than psychological. To the people of old, psyche controlled the physical.

For TNC to adopt a simple procedure such as this is to model the sensitivity of adopting native practices when dealing in native environments. In pragmatic tones, chants such as this remind the person entering of the focus of the work ahead and how this work relates to life, not just the life of the forest, but the life of the land.

Educational Opportunities

Another form of mitigating the psychological impact of fencing up sacred territory is by including community people, targeting, but not limited to, the native Hawaiian population. The native Hawaiian population may appear apprehensive at first, but their investment in Ka'ū is the longest living. Reliance on the native population to participate in the maintenance of the sacred environs of their district is two-fold:

1. It provides a venue for many detached native populations to recover primal connections to their immediate environment.
2. Because this is their home, the long term effects of investing in the native population as co-stewards to the units under the legal-stewardship of TNC is a security not reliant if placed on transient residents.

Holistic Education

Holistic education has always been an integral part of traditional life in Ka‘ū. Living in Ka‘ū without developing a time-tested intimate relationship with the natural environments would have meant death to the early Polynesian migrants. Colonial idealism and the modernity based on consumerism has blurred the senses of most of Hawai‘i’s residents (native, non-native, full-time residents and transients) where environmental concern and engagement are issues, having literally severed any concern for the natural environment in which we live. TNC is in an ideal situation to provide sound reason for the preservation and perpetuation of Kaiholena and related units through holistic educational opportunities.

If educational programming is outside of the mission of TNC, I recommend that the mission be revisited to include educational opportunities. It is a very foreign concept that will not get a warm welcome in Hawai‘i when plots of land are purchased by foreign agencies that soon put up fencing to keep out not only the ungulates but the natives that have lineal rights of access to said properties. Another route toward enlisting educational opportunities is partnering with other “green” agencies that have education as an objective toward their mission.

RECOMMENDATIONS FOR FURTHERING THE CIA

The following are bulleted items for furthering this CIA:

- Allow for appropriate time to include an assessment of Kāhili, Kī‘olokū and Keāiwa units.
- The rurality of the district still fosters oral transmission of records relating to the natural resources, of which the four units are included. Including interviews and oral histories would lend considerably to the assessment. As it stands, the assessment is absent of these primary resources.
- Appropriate funding will allow for a team of researchers to collaborate in the assessment, providing for a non-myopic scope of the assessment.
- Assessing culture and its inevitable evolution as it relates to a place is ongoing. TNC may want to consider doing a ten-year follow up assessment on its units. In addition to this, often times primary and secondary information integral to the study may not avail itself immediately. Considering this may warrant an assessment update.

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Biography of Hālau O Kekuhi

Hālau O Kekuhi is a school of traditional hula. Located in Keaukaha, Hilo, Hawai'i, the school's matriarch is Kekuewa Ahi'ena, a descendant of Puna families. Kekuewa's daughter, Edith Kanaele Kanaka'ole, married a Ka'ū native, Luka Kanaka'ole. The current stewards of the school, Pualani Kanaka'ole-Kanahele and Nālani Kanaka'ole, are therefore offspring of both Puna and Ka'ū cultural traditions. The intrepid reliance of Hālau O Kekuhi on primal religion through hula is credited to their Ka'ū connections.

Pele Hanoa is a Ka'ū native, speaker and practitioner of Hawaiian culture.

APPENDIX A

From: Sam Gon [mailto:sgon@TNC.ORG]
Sent: Monday, April 18, 2005 8:28 AM
To: laura_nelson@TNC.ORG
Cc: kfrias@hawaii.edu
Subject: RE: Ka'u Plan

Aloha Laura:

It is good to hear that Taupōuri and Kekuhi have had a chance to look at the details, generalize the district-level cultural considerations, and focus on the specifics of the fenceline. That was my intent when I suggested it to you. Not to broaden the scope to include the cultural significance of all of Ka`u (that indeed would be a huge task), but rather just to make sure that the cultural impacts are done in the proper context of the surrounding lands, ahupua`a, and moku.

I am glad to hear you are moving forward with this. I am confident that Taupōuri ma will provide an excellent review so we can better protect the wao nahele in a manner that matches its great significance. Let me know if there is anything I can do to assist. Convey my aloha, please.

me he kanaka kia manu au,

Sam

Samuel M. 'Ohukani'ōhi'a Gon III, Ph.D.
Senior Scientist / Cultural Advisor
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Pehea la ka papa 'auwai o Oloku'i kau i ka 'ohu?

APPENDIX B

Notes on TNC Iholena Bananas
Angela K. Kepler & Francis G. Rust

The Nature Conservancy

Pu'u Kaiholena

8/25/04

Lisa Raymond of Maui Nui Botanical Garden, referred a phone call from Basil Hansen to us regarding the identification of bananas growing on some Nature Conservancy (TNC) land. Basil made arrangements with John Replogle, a resource manager at TNC in the Ka'u district. The site is located 5 miles mauka of Punaluu Black Sand Beach on the south side of Pu'u Kaiholena. The banana clump we saw was at N19°09.775' W155°34.910' elev 1960'. However, to get there we left the pavement Na'alehu and traveled about an hour on cane haul roads that were 4 wheel drive only.

Location

The bananas were located in scattered patches at the base of Pu'u Kaiholena ("the hill of the iholena bananas"). They were on both sides of the cattle fence that separated the native forest on the pu'u from cattle pasture. The only banana patches we saw up close were in a lightly grazed pasture. We lacked the time to hike around and get a feel for the overall extent of this banana area; John said that it is more extensive than what we saw.



A typical patch of Iholena Kapua, Hawaiian "Native" Bananas

Bananas

The bananas are of a variety found only in Hawaii: *Iholena Kapua*, characterized by an exceptionally long red peduncle (upper fruit stalk). In addition the cream colored, abundant male flowers bore typical lavender stamens, while the undersides of new leaves were bronze-purple. The fruits were typically of the iholena group: pale yellow-green, perpendicular to the rachis, and with tapered apices (ends). The only differences from typical *Iholena Kapua* were that the undersides of *all* leaves were glaucous bronze-purple instead of just the newly emerging leaves), and that the leaf sheath bases on some pseudostems were about half-black. In our experience, such variation is not unusual. The standard description of an *Iholena Kapua* is in (Banana Culture in Hawaii W.T. Pope, Hawaii Agriculture Experiment Station, Honolulu HI, U. S. Dept Agriculture Bulletin No. 55 pp 43, 1926).



The Iholena Kapua has a long peduncle



The underside of leaves are purple-bronze

Background

To understand what is happening to the bananas at Pu'u Kaiholena, one needs to understand the normal life cycle of an *Iholena Kapua*. A banana life starts with a solidly connected sprout from the root corm of a mature banana clump. When the sprout (*keiki*) reaches a height of 2 to 3 feet, it puts out its own leaves and starts to be self-sufficient. A normal *keiki* like this is called a sword sucker, because it is all shoot with only thin, insignificant leaves. By four months old it is about 4 feet high. As the plant continues to grow, it puts out 2 to 4 leaves each month till it is about a year old, then it produces its last, smallest leaf, then a bud. Over the next 5 months the bud develops into fruit which expand and ripen. The plant has finished its life cycle; it dies and falls. The lifespan for an *iholena kapua* plant in cultivation is about 17 months.

The impact of cattle, pigs and wind

Cattle and pigs fragment the root corms of bananas. Pigs love to root up and eat the starchy, juicy inside tissue of the corm. Uneaten pieces of corm sprout and produce weak suckers that are not attached to corms of mature plants. Therefore, they must sprout leaves before they are $\frac{1}{2}$ foot high for they must be self-sufficient. These tenuous sprouts with premature leaves are called water suckers. They are an easy meal for a pig. If they don't get eaten and continue to grow, they are the first plants to blow over because they are poorly anchored.

Well established, mature banana plants are sometimes knocked down by strong winds as well as by cattle. Often they sprout from the trunk as well as from the root corm and thus form a line of *Keiki*.



A line of keiki growing from a fallen banana plant



Banana corms eaten by pigs



Banana water sucker

Observations

Three quarters (about 50) of the *keiki* bananas were water suckers that were growing from fragments of corm. Some had purple blotches on the top of their leaves, a sure sign of stress. Of the mature plants, only 5 plants had a bud and/or fruit. The pseudostem of the fruiting plants had heights (the distance from trunk base to the highest point on the fruit stalk) 10.0, 11.5, 12.0 feet. We censused the grove with its fragmented banana patches.

Table #1
Banana Plant Census Data

			No fruit	Fruit	
Height group (ft)	1 - 4	4 - 8	> 8	> 8	
Approx. age (mo)	0.7 - 3	3 - 7.5	7.5 - 12	12 - 17	
Months in group	2.3	4.5	4.5	5	
					total
Number of plants	67	47	47	5	166
plants/month	29	10	10	1	

The conversion of height to age was based on age and height measurements of an *Iholena Kapua* grown in cultivation.

Discussion of Census data

The usefulness of census data is limited to a little more than the preceding year by the 17 month lifespan of the plants. From Table #1 it can be seen that about 29 bananas per month sprout and are included each month in the shortest group. This number is high and probably reflects the fragmentation of the corms during the year. Since $\frac{3}{4}$ of the plants are water suckers, most of these will probably be eaten or trampled before reaching the height of 4 feet. The census shows that only about 10 of these 29 plants per month will survive and make it to the midsize group. Almost all of the midsize group will continue developing into the largest non-flowering group. The lack of fruiting plants in the tallest group probably reflects severe mammal damage to young plants a year ago (May to August 2003).

Conclusions

The damage to this patch is extensive. Cattle had opened up the area and feral pigs had rooted up many young banana plants and hollowed out both large and small corms. Both pigs and cattle have undermined the root systems of virtually every banana, causing them to be highly susceptible to wind damage and uprooting. The major damage was at least 6 months old much likely resulting from serious storms in January and February. Thus the fallen mature plants represent a combination of heavy wind and rain, cattle, pigs, and an occasional plant falling after fruiting. Judging from the churned up patches that we saw, replete with pig footprints, undermined root systems and

pig hollowed out corms, it appears that Hawaii's winter exacerbated many weakened banana plants causing them to topple prematurely. John mentioned that a short electric fence might keep both pigs and cattle out of the banana patch we saw. This seems like an excellent solution to help the bananas. A banana patch would also act as a buffer between the pasture and native forest, since pigs and cattle prefer bananas to native forest plants.

Hawaii's "native" bananas (varieties which evolved here in Hawaii after their progenitors arrived as "canoe plants"), as a whole, are highly endangered. Only relatively few areas still exist where they may be found growing in a wild situation. In all these locations on every island native bananas struggle to compete with invasive plants, cattle and pigs.

Recommendations

We recommend that this remnant *Iholena Kapua* grove at Pu'u Kaiholena be protected by fencing out all marauding animals. This is the only hope for its long term continuance. We do not know how many groves of wild bananas (of any variety) exist in the Big Island's hinterlands, but suspect that there are few. About 90% of the native bananas that been transported from the wild into arboretums have died of insects, disease, inadvertent spraying and most recently Banana Bunchy Top Virus (BBTV), or the BBTV control measures. Although tissue culture techniques look promising, most native bananas in tissue culture have died.

APPENDIX 3

COMMENTS RECEIVED ON THE CULTURAL IMPACT ASSESSMENT

Oral comments were received from Keolalani Hanoa, cultural specialist and ahupua‘a tenant of Punalu‘u, on January 30, 2006. Her comments regarding the Cultural Impact Assessment are paraphrased below.

Cultural Significance of Kaiholena

The most important cultural significance of Kaiholena was that it provided the mea wai, the waters, which gave the life – which nurtured – this ahupua‘a. Kaiholena provided the water source all the way down to the sea. When C. Brewer did its testing in the 70’s and dropped the dye up there, the dye came out here! Without this water resource – if Kaiholena didn’t provide water – no one would live in Hīlea. So Kaiholena was the source of all of the nurturing and feeding of everything living within this area. That should have been the meat of the Cultural Assessment. People came here first because there was an abundance of water. That’s why we have that word, wai wai, which means to be wealthy. It’s “water water.” Without water you could not survive. The next ahupua‘a, Kāwā, is not as abundant with water resources as ours is here. All of the veins that come down to Punalu‘u are fed by the waters coming out of Kaiholena. That’s why it was the source of life. It gave life to people, to plants, to all living things of this earth. Without it people could not farm here. It would be desolate.

What else was really important about Kaiholena, it didn’t only play a part in hula, it played an important part in everyday life which we call ka noho‘ana, traditional ahupua‘a lifestyle. Kaiholena played a part in everyday living in every aspect. Ka noho‘ana is how we interacted within our surrounding environment. And Kaiholena and its waters played a very important part, because it was the source of life. So it touched all the different aspects of Hawaiians and our culture, more so the living day to day interactions of plant, animal, the ‘āina, food and everything. It was the source of all of us being here. It is what feeds us. The word ‘āina, ‘ai is to eat, adding the na is what nurtures us. Same thing, it is what nurtured us, what fed us. That’s what made Kaiholena so important to the Ka‘ū people. Because we live in a district that is half desert, and half green. The waters of Kaiholena which come down to Punalu‘u are also referred to in chants and written Hawaiian history as the hidden waters of Kāne.

‘Ōpelu Grass

One thing that’s not listed in the Cultural Assessment is the ‘ōpelu grass. If you look in Martha Beckwith’s book she talks about the ‘ōpelu grass, and I think Handy, and Pukui, Native Planters, also talks about ‘ōpelu grass... ‘Ōpelu grass is a grass that looks like California grass, that has a wide blade and two fins, and it’s silver. Why is it called ‘ōpelu grass? It looks like an ‘ōpelu fish, or mackerel. What is its significance to Kaiholena? It was Kūmauna’s favorite ho‘okupu in times of draught. Only on top of the fall can you find the ‘ōpelu grass. I’ve seen the ‘ōpelu grass with my dad and the blade is shaped like an ‘ōpelu. My great-great grandma would go up there to pule for rain for three days and three nights, that’s what she’d take. And on the third night she would come home and it would rain.

Iholena Banana

The banana pictured in the Cultural Assessment is not the iholena banana nor is it the location of the iholena banana. That banana is the wild kind. The plantation used to plant them in all the places where there were pukas. That’s not iholena. Iholena’s whole stalk is purple. Where it is, is on the side of the pali. Me and my father went up there to pick maile, I fell off the pali right into the patch. It’s imbedded in the side. It’s not on the top, it’s not on the bottom. I knew I was in there because I fell down the cliff and went on the side, and I could feel my heart beating, and my hair stood on end and I looked up at these tall trees that were black – bananas. The trunks are black, the underneath is not this light purple like in the picture. It is purple! The whole thing! And Mama talks about using them to weave into hats. It’s a cooking banana, not a regular eating banana. The fruit goes up like a hand, five bananas per hand. The iholena banana grows like a hand because it’s significant of Kūmauna – his touch, his hand.

It didn't grow in the open, it grew on the side. It grew in the forest, amongst the trees on the pali's. The kind in the photo is the kind they call the wild apple.

Where I saw the iholena patch, I was on top of the waterfall and right below was the bulldozed area where C. Brewer planted azaleas... right on the bottom of that fall. Right on top is 'ōpelu grass. 'Ōpelu grass grew all in that area. You used to be able to drive a truck in there but you can't anymore. As you descend down on that road that used to be nice, I'd say half way down that road, it's right off that pali, that sheer cliff. If we're standing on the top of the fall and we're walking back down it's on the side of that ridge, on the opposite side. You can slide down, it's nice and gradual. It was a big patch. They were in muddy water, like swampy mud. My feet came out of my rubber boots like quick sand.

The most similar banana that I've found is called the fe'i. It's a cooking banana from Tahiti. I saw it when I went to Tahiti, and I said, that's iholena! And it's very yellow inside and when you eat it, it makes your shi shi yellow too, just because it's a lot of coloring. Same effect when we ate the fe'i. It's a cooking banana, too. It came from Tahiti to begin with.

Other Culturally Significant Resources

Kaiholena is known to have large populations of 'io's, the native hawks. As I grew up I traveled that whole ahupua'a by horseback from there to here. Why are there a lot of hawks up there, and numerous nests? Because the 'io was the kinolau, the body form, of Kūmauna. And when we would get lost in the forest it was the 'io that would take us out. They would come and cry and circle us and pull us out of the forest when we were up there late.

From the forest we gathered olonā, kukuma (fern shoots) for food, maile, 'ie'ie, but most important in its connection to fishing was the olonā. It was highly prized and didn't grow in many places. For the fishermen here to tie up their canoes, their first choice to use for lashings was the olonā. It's like nylon on the inside. We'd go up there and gather. To get olonā meant that you were special.

The Ahupua'a

Kaiholena is in the ahupua'a of Punalu'u. The ahupua'a is our ahupua'a where we are right now (Punalu'u). Our family is the ahupua'a tenants, we never left. When you look down from Kaiholena you can actually see the ahupua'a's different wao's: the wao kanaka, etc.

The name of this ahupua'a is Punalu'u Wailau, together. Kaiholena is the point, the tip of our ahupua'a. The wao akua. Grandma will tell you they always referred to this as Punalu'u Wailau. When you go down, past us, down to Nīnole, there's Wailau Kai, in the middle. In between Nīnole and Punalu'u is called Wailau Kai, almost when you reach 'Ili'ili Hanao. This is Punalu'u Wailau. Hīlea goes with Nīnole. Each ahupua'a needed a beach. You cannot have an ahupua'a without a beach. Kaiholena sits in the middle of Pu'u 'Enuhe and Makanau, in the back. That belongs to us. What's interesting with our landscape here in Ka'ū is that every mountain distinctly marks an ahupua'a. Makanau goes with Hīlea, Ka'alāiki goes with Kāwā.

Access Issues

There isn't any problem with you guys' fences. The main thing is that you leave access for us. There is a little animosity with the gatherers and the hunters that are used to going there. But for me, because of the times that we live in today, as long as we are given access... And now when I talk about access I don't mean the access that you folks give us. The traditional access. The hunters and gatherers of today are not taught protocol, like us before, so there is a problem. Because they're greedy, they're destructive. But for me as a native Hawaiian, as long as I'm given access, as long as my students, my children, my family can go up there and have access provided, I don't have a problem because I can find what I need. I need to drive up Richard's road because I'm handicapped, but once I'm to the edge, we walk in there. There's no driving in there. Put a gate in the fence so people can go through. Work with us, or work with the hunters to locate where they would access. That would be the biggest thing. As long as they have access, they're less likely to destroy your fence. Step-overs would be fine, so they could continue accessing. People are not conscious today. They've destroyed the forest. It's better Nature Conservancy get 'em, I

guess, than the State, because the State doesn't have the money to take care of it. As long as Nature Conservancy understands the need for our people to go there.

Legend of Kauila

Page 21. "Punalu'u means to dive for spring water." Punalu'u means diving spring. In the 70's C. Brewer built that restaurant and they created the story of Kauila. "In association to Punalu'u, is the honu deity Kauila, a protectorate of children of that area." That whole story is made up. We have mo'o: lizard deities. When Herb Kane made that painting in the restaurant, they said, because we have so many turtles, let's just put a head on it, and sell it. Kauila is the name of that pond behind the lei stand. It has to do with the mo'o Goddess named Kauila. She protects all of the honu'ea's (Hawksbill seaturtles) and she lives in that pond. The protector of all of the children here is the shark god, Keali'i kao o ka'u.

Kūmauna

Kūmauna was an important deity for this area because he controlled the rain. The most important thing was that he was part of their everyday lives. Like Pele – Taupōuri talks about her in there – there is a difference between the Ka'ū Hawaiians and the Hawaiians that dance hula and revere her as that entity. My mom's name is Pele. For us she's grandma tutu. For them she's goddess, for us she's family. We interact with her on a daily, regular basis. Although she is the deity, she was an everyday thing, like Kūmauna was an everyday deity. We incorporated these deities into our daily lives. That is ka noho'ana. It's incorporating all these facets of Hawaiian culture into our daily lives.

Kaiholena is the wao akua, where we go up and gather our stuff for hula, our palapalai, our 'olapa. But I think it was sacred for me, as an ahupua'a tenent, it was really sacred to hula but it was more sacred to every day life. That's what makes it significant. It had a more universal role. Kūmauna is like the heartbeat that keeps everything going.

Kūmauna's Stone

All of us growing up had caves up there that had water, and had watercress growing inside. All of us who lived here, my grandma who lived in Hīlea, had her own cave, her own well. And in the old wells, we had our water boxes that we used to pipe our water to our places, and we had to go clean them every year. Kūmauna had a kū'ula, which is a rock figure of him that was half black, half white. Kūmauna went to go plant his bananas and didn't ask, and didn't give her the first bunch like he was supposed to. When there were times of draught our grandparents of the village, the women, my grandmother was one of them, would go up there, with her ho'okupu of 'ōpelu, (that's how the 'ōpelu grass got up there). They would go up there for three days and three nights and wail and pray. The third day they would come down and it would rain.

My grandparents tell us this story. It was in a time of draught and Gilbert Ceril was with my great-great grandfather, Kainoa Kukunakaiananui. They went past this cave and there was this stone and it was black and white. He was, like, "You superstitious Hawaiian's! You don't know what you're talking about!" So he pulled out his rifle and shot it. Ceril shot the rock and destroyed it. They found him three days later being eaten by pigs. That was the worst flood Hīlea had. My grandfather remembers it as the worst flood. He remembers my grandmother having to go out and make a pū'olo of food and going on the side of the river and seeing the waters recede.

The great-great grandchildren of the Ceril's, the Becker's, still live up there. There are still rocks in the Becker's place from the flood. Everytime it rains it floods his place, that's the consequence. I don't think the caves are there any more. They're overgrown, caved in, flooded. I think that's probably a good thing.

The stone was between Kaiholena and Pākua, near Pu'uiki, where the eucalyptus is now. It was somewhere where the people could go and give homage, so they didn't put it too high or they couldn't get to it. It's hard to say exactly where because of the cane, so it's better to make that whole area sacred, because it is. As above, below, around... That's why they say wai ikapu, sacred place. No, it's not sacred place, it's the *sacredness of place*. The trees might fall down but the place never changes, mana of place never changes. Just because people pull up the trees doesn't mean that the 'āina no more mana!

Heiau

I've never seen any heiau's up there, except for of course on Makanau – and I maka kaloa, which is the only hula heiau on our island. I maka kaloa, he was a Puna chief. It's covered in wili laiki, and if you go on Uncle Hapi's road, it's still there. It's right below Ka'alāiki mountain on the Honu'apo road. It's documented in Majestic Ka'ū. If we had to, we could find it.

The heiau on Makanau, Koaikalani, is called a ho'omana heiau. That's where you would go to pray for healing of your people, for empowerment. There are different kinds of heiaus, for different kinds of things. And that heiau was used for ho'omana, for empowerment.

Ka'ū and Waipi'o

One of the most interesting things about the people in Waipi'o and Ka'ū, even how diverse the land is, Waipi'o compared to us, how the people lived in the land, how they cared for the land, was identical. The fishing would be the 'ōpelu, because down here we have all 'ōpelu fishermen, so that would be a fish that would be connected to Kūmauna.

Moku o keawe

The reason why Keawe was the first king, is because his mother was the queen Kekealaniwaihine, from Kahuku. This island was ruled by a queen. She was the most sacred queen of her time, having two children, Keawe and Kalanikauli'i. They are the progenitors of all of the ali'i lines of all of the islands. Kalanikauli'i married the four chiefs, Keawe did the same thing, they created them all. If no more them, no more ali'i's! Umi wasn't a king, he was a chief and of half kawa blood, which got him the boot. But his children married the Ka'ū chiefs. Umi was the most loved. He was a good chief, because he understood what it was like to be poor, of low rank.